STUBBE
GLANVILLE
PHILIPPS

1671 ETC





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2) Legend. ms londonse. 1670.
3) Compotella revived. 1670.
4) GLANVILLE, J

5) PHILIPPI, F

Plate no. 2 (the Plate Letter reduced to a
not plate) formerly placed after Compotella
revived. Moved to follow pt. i 1951 (Sept)
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Legends no Histories:

OR, A

SPECIMEN

Of some

ANIMADVERSIONS

Upon the *HISTORY* of the

Royal Society.

Wherein, besides the several Errors against Common Literature, sundry mistakes about the making of *Salt-Petre* and *Gun-Powder* are detected, and rectified: whereunto are added two Discourses, one of *Pietro Sardi*, and another of *Nicolas Tartaglia* relating to *that Subject*. Translated out of *Italian*.

WITH

A brief Account of those passages of the *Authors Life*, which the *Virtuosi* intended most to censure, and expatiate upon: Written to save them the trouble of doing any thing besides *defending themselves*.

TOGETHER

With the PLUS ULTRA of Mr. *Joseph Glanvill* reduced to a NON-PLUS, *&c.*

BY

Henry Stubbe, Physician at *Warwick*.

At vos interea venite ad ignem
Annales Volusi, cacata charta. Catullus.

Printed at *London*, and are to be sold by the Book-sellers there. 1670.

The Preface to the Judicious

READER.

IT may perhaps, and that not *unjustly*, be wondered, that I should appear in behalf of the *Antient* and *Aristotelian* Philosophy, who have always been thought averse from *it*, and inclined to that which is more *Novel*. And it is true, that I have not such a *veneration* for the *Peripatetical Physicks*, as some others have, nor do I think *they* so *satisfactorily* explicate the *Phœnomena* in *sublunary* things, as that an inquisitive brain can *acquiesce* therein: but this is not so much the *deficiency* of *that Learning*, as of *humane Nature*; the attempt it self being so *little feasible*, that *whosoever* shall design *any such thing*, shall involve himself in the *like miscarriages*, as appears from what *Gassendus*, *Des Cartes* and others have done, from whose performances the *greatest* advantages we have yet derived is, that it seems manifest how *easie a thing* it is to find *defaults*, and how *difficult* to amend *them*; and how the *Man* of *Stagira* was not *singular* in his *faylors*.

If the *Cartesian* Hypothesis seem to be *demonstrated sufficiently* in *this*, that it is agreeable to the *general occurrents of Nature*, and solves the *difficulties* emergent, as if it were absolutely *true*: If this, I say, may pass for *sufficient proof*, I know not why a *Physician* may not submit unto the *like conviction*, who dayly *experiments* that the *Aristotelian* Philosophy (which with some little *discrepancie of opinions*, and *diversity of explications* hath been transmitted from the *Asclepiadæ*, *Hippocrates*,

How false that *Cartesian* assertion is, the learned and pious Dr. *More* hath in sundry pieces demonstrated. *Anton. vander Linden* de circuitu sanguis. l. 2. q. 17.

Exercit. 9. Sect. 221. *Hieron. Mercurialis* de hom. generat. c. 2. *Andr. Laurent.* anatom.

and

and *Ariſtotle* to their *Alexandrine*, *Grecian*, *Sarracenical*, and *Chriſtian* Phyſitians through ſo many *ages*, *revolutions*, and different *Climates*) is moſt conformable to the *Subject* about which his *Faculty* is employed, the *explanation of Diſeaſes*, *their Nature*, *their Symptoms*, *their tendency*, and *Cure*? Not only the *Chyrurgical*, but *Medicinal* part of *Phyſick* hath been carried on and *ſtated* upon thoſe *general grounds*, and that with ſuch *aſſurance*, that where any *learned* and *ſolid practitioner* of *that way* ſhall happen to be *at a loſs*, thoſe which are *enemies* to it, the admirers of the *Virtuoſi* and of *Odowde*, have not been able to make any *conſiderable* advantage *thereby*. Moſt that the *Novelliſts* have done, is to find out *new reaſons* for an *antient practice*, and to ſhew how the old *Medicaments* wrought to *their effects* in *another way* than was ſuppoſed: but they have neither diſcredited the *Medicines*, nor *Method* with any *underſtanding* men: Whatever *ſuperlative diſcoveries* have been made of late, a ſhort *time* and *tryal* hath convinced *us* of the *inutility* of the moſt famed *inventions* and *Theorems*; and the *tedious*, *coſtly*, *new Medicaments* have ſcarce continued to be *nine days wonder*. I ſpeak not this out of *contradiction* I carry to theſe *Virtuoſi*; it is the reſult of my thoughts after twelve years of *deliberation*, after *obſervations accurately made* in my *own practice*, and in that of other *antient* men: and as it is *known* how I never deſired any thing ſo much as the *benefit of my Patients*; ſo I hope I may be believed when I proteſt that my *Ambition* and *Intereſt* both ſuggeſted unto *me* a deſire of *atchieving Miracles in Phyſick*, if it had been *poſſible*. But, ſince whatever *repute* I have required I owe it to that *Phyſick* which hath deſcended down unto *this age* by the means of ſuch as have been of the *Ariſtotelian* and *Galenical* way; I am but *juſt* unto thoſe *Worthies* in thus declaring againſt their *puny Adverſaries*, who deſerve all that *contempt* wherewith we *depreciate* the *illiterate* and *fools*, when they tell us that the *Antient Method* will not qualifie *us* to *work*, or enable us TO CURE A CUT FINGER, may leſs diſcover the *nature*, and *courſe of Diſeaſes*, the *operation of Druggs*, and the *right compounding of them* for the benefit of the *ſick*.

Mr. *Glanvil* in his plus ultra pag. 7.
Mr. *Sprat*, pag. 317. and 327.

Although

Although that this Reason might sufficiently justifie me for what I have done, yet I had more powerful *inducements* which pressed me unto this design; and those are the *exigences* of the *English Monarchy*; whereunto since the *good Providence* of *God* hath subjected us once again, it is the *prudence* of every particular person to contribute all he can to the support of it, against all such intendments as may either introduce *Popery* on the one side, (which renders the *Title* of our *King*, and his *power* precarious, and will subvert the whole *Commonalty* of *England* in their *Estates*, not to mention the *concern of our Souls*, and that *intellectual slavery* whereto we must submit) and against all *Anarchical projects*, or *Democratical* contrivances, whereof a *debauched* and *ungenerous* Nation is not capable, and which cannot take effect without such *variety of changes*, as no *sober* man will think upon without *horror*, nor any that is *wise* pursue as *feasible*. I do avow therefore that the *desire* I had to contribute what I could to uphold the *Fundamental Policy* of these *Kingdoms*, was the principal *motive* I had to write this Treatise: and that how *willing* soever I was otherwise to discharge all *intelligent* persons from the *insupportable* prating of these *Comical Wits*, and to avenge *my own faculty* upon these *insolents*, yet the *circumstances* which I saw might create me *future troubles* and vexations were such, that nothing less than a *generous* and *necessary inclination to serve my Countrey* could have made me *despise them*. I have so *small a regard* for deep and subtle inquiries into *Natural Philosophy*, and the *intricate Mechanismes* by which *this World* is *said* to be governed, that could *Physick* be unconcerned in *their debates*, could *Religion* remain *unshaken* amidst the writings of these *Vertuosi*, could that *Education* be carried on happily whereby the *Subjects* are qualified to serve their *Prince* in all *Negotiations* and *Employments*, and their *Countrey* in *Parliament*, I should not entermeddle: but, if we look

Whosoever would be satisfied about the *imprudence, vanity*, and *perniciousness* of all attempts to subvert the *Monarchy* of *England* now, and introduce a *Democracy*; I would advise him to read over the Political discourses of *Malvezzi* in *Tacitus*, disc. 3. *Boccalini* advert. cent. 2. advert. 30. *Paolo Paruta* disc. polit. c. 8. *Chr. Forstuer*, in *Tacit.* l. 1. p. 3, 4, 5, 6. Ut verissime dixerit *Cosmus Meaices* Cardinali *Salviato*, in tanta opum inæqualitate, morumque corruptione, *Florentinam* Rempub. non esse amplius *libertatis* capacem, quæ optari potius quam sperari debeat. *The reasons why the last* Brutus *miscarried in his design, will convince any man.*

look *de facto* upon theſe *Experimental Philoſophers*, and from too *fatal tryals* judge how little *they* are fitted for *thoſe truſts* and *management of buſineſs* by that ſo famed *Mechanical Education*: and if we conſider how much this Nation owes to *Burleigh*, *Walſingham*, *Jewel*, *Abbot*, *Perkins*, *Whitaker*, *Uſher*, *Davenant*, *Caſaubon*, &c. & that by complying with theſe *Novel projects* for the breeding up of *Youth*, we deprive our ſelves of all *our hopes* to ſee *ſuch perſons* either in *Church* or *State*; we muſt riſe as highin our *reſentments* againſt the *Authors of this Hiſtory*, & Mr. *Glanvils* Book (where more than *one* or *two Virtuoſi* that contributed unto it) as the *concerns* of the *preſent Age* and of *our poſterity* can animate *us*. That *Art of reaſoning* by which the *prudent* are diſcriminated from *fools*, which *methodizeth* and *facilitates our diſcourſes*, which informs us of the *validity of Conſequences*, and the *probability of Arguments*, and manifeſts the *fallacies of Impoſtors* and *Comical Wits*; that *Art* which gives *life* to *ſolid Eloquence*, and which renders *States-men*, *Divines*, *Phyſicians* and *Lawyers* accompliſhed, how is this *cried down* and *vilified* by the *Ignoramus*'s of theſe days? What *contempt* is there raiſed upon the *diſputative Ethicks* of *Ariſtotle*, and the *Stoiques*? And thoſe *Moral* inſtructions which have produced the *Alexanders* and the *Ptolomeys*, the *Pompeys* and the *Ciceroes*, are now ſlighted in compariſon of *day-labouring*! Did we live at *Sparta*, where the dayly imployments were the *exerciſes of ſubſtantial vertue* and *Gallantry*, and *men*, like *ſetting-dogs*, were rather *bred up unto* than *taught reaſon* & worth, it were a more *tolerable propoſal* (though the *different policy* of *theſe times* would not admit it) but this *working* ſo recommended is but the *feeding of Carps in the Ayr*, the *weighing of a pike in water*, the *cooling of Wine with Sal Armoniac*, (publiſhed long ago by *Berigiardus*) the *guilt varniſh* (no *ſecret* to ſome *Trades-men* in *London*) or the inventing of an *Ambling-ſaddle*. As for the ſtudy of *Politicks*, and all *Critical Learning* together with *Church-Hiſtory*, theſe are either *pedantical*, or *tedious* to thoſe who have a ſhorter way of *ſtudying Men*? Thoſe *Metaphyſicks* which the *conſtant policy of Chriſtendom* hath found ſo advantageous, that without a *Miracle* we could not have born up againſt the *Heathen-Philoſophers*, *Arrians*, *Sarracens*, and *Socinians*,

Mr. *Sprat*, pag. 324.

See Mr. *Glanvill's plus ultra* pag. 123. & pag. 118, 119.

Mr. *Sprat* pag. 341, 342.

Mr. *Sprat* pag. 326.

nians, and out of which we do so confound the *Papists*, these must be *laid aside*; and are we not then in a fit posture to encounter *Bellarmine*, and *Baronius*? I remit these things to the consideration of all *serious patriots*, and do earnestly desire that they would with attention read over *Campanella* concerning the *Spanish* Monarchy, *Ch.* 23. *pag.* 142. *ch.* 25. *pag.* 157. *ch.* 27. *pag.* 177, 182. and the last part of the *History of the Royal Society*, and maturely *whether* the *projects* of the *one* be not put in execution by the *other*.

I follow the English Edition of *Campanella*, and do recommend these places, especially the last *citation*, to every serious *Patriot* his consideration.

I doubt not but *this attempt* of *theirs* was *no part of the intentions of* their *Royal Founder*: I am sure the *publique utility* is more dear unto *Him* than the giving of some men an opportunity to *entertain their Melancholy*, and *divert their idle hours*, or to acquire the reputation of *Airy* wits and *Drolls*: if *He* be *their patron*, it is certain that *He* is the *Father of his Country*, and the *Head of the Church*; the *obligations* he hath to these are so *great* and so *near unto him*, that these little *Engagements* must give place thereunto: Nay, *He* hath herein been *Exemplary* to his *Subjects*, by withdrawing much of his *Encouragements*, and testifying frequently his *disesteem* of these *Experimental Philosophers*. Thus many of the *Nobility*, most of the *Physicians*, and other *understanding* and *serious* persons have either totally deserted the *Society*, or *discontinued* their presence at their *Assemblies*. And I could wish they would not *abuse* the World with *false Catalogues*, but give us a *true one* of such men as do *now frequent their meetings*, *keep correspondence with them*, and pay the *usual contribution*.

Having so great Presidents to justifie my *contempt* of *them*, methinks I need not apprehend the *censure* of those *Illustrious* and *Honorable personages* who might otherwise seem concerned in this *Quarrel*. The same *motives* which prompted them to advance the *Royal Society*, must now excite their *indignation* against them: the desire of advancing of the *Glory*, and the trading of *this Nation*, & of understanding *natural curiosities* engaged them in *this Society*; but now that these *men* have no way answered *their expectation*, since their *relations* and *Experiments*, are so *trivial*, *defective*, and false, since that the *Authors of*

this

this fatal History have more in them of *Campanella*; than of Mr. *Boyl*; ſince they have relinquiſhed the *original deſigns*, and *deviated* ſo notoriouſly from the intention of the *Royal Founder*, and what thoſe *Eminent perſons* purpoſed, who *firſt* cloſed with *them*: I will not think *them* any more involved in this *conteſt*, than *patrons* are where *their favours are abuſed*. And I proteſt that I bring with me all the *reſpect* and *Honor* in the world for thoſe *perſons of Honor*, who in ſo *diſſolute an Age* gave the world that teſtimony of their *generous intentions*, which was to deſign the *improvement of uſeful knowledge* by theſe men: And I am concern'd to ſee their *Gallantry* ſo abuſed, ſo that nothing *exaſperated my peace more* than a *reſentment for their Honor*: Had the *Experimental Philoſophers* acquitted themſelves in *their truſt* better, yet ought I to have been *commended* for *animadverting* upon theſe *Books*: the *notorious untruths* and *Errors* againſt *common Literature* were ſuch, that *Foreiners*, who inquire into the *Writings* and *tranſactions* of theſe *Comical Wits*, would have concluded that we were *univerſally* degenerated into the old *Britiſh* ignorance, and that the *Bards* once more ſwayed in *this Land*: But I have taken off from the *generality of this imputation*; and dare preſume that thoſe that were no more than *Honorary Members* (and conſequently not concerned in the *private* conteſts and *ſuits* of the *Corporations* they *ſo* ſtand related unto) will expreſs a kindneſs for my *performance*.

Having thus excuſed my ſelf to the *perſons of Honor*, I ſhall briefly ſay ſomething to thoſe of *unqueſtionable Learning* that reſide amongſt the *Society*: I am ſorry to finde *them* there, and that I muſt accommodate to their *worth* that Ancient ſaying, *Ingenium Galbæ male habitat*: their *number*, and *intereſt* ſeems ſo ſmall there, that this *Hiſtory* could paſs with *applauſe*, notwithſtanding *them*, and Mr. *Glanvil* be commended: with what *credit* can they reſort unto the meetings of theſe *Comical wits*, whoſe *ridiculous actions* reflect upon *them*, and upon which *Aſſembly* to beſtow the *Elogies* of the *Learned*, or *Vertuous*, 't would be as improper in an *Ariſtotelian*, as to denominate an *Æthiopian* to be *white* becauſe of his *Teeth*? He muſt

be

be *insensible of all merit* that can derogate from Sir *Robert Murray*, Dr. *Wren*, or Dr. *Wallis*: and to suspect that the truly Honorable and *inquisitive* Mr. *Boyle* would abet a *design* that should subvert *piety*, and the *Protestant Religion*, doth not become any that knows *him*, or his *Writings*. But since *good men* are often-times made use of to *pernicious* ends, and *unwittingly* become *instruments* of the *basest frauds*; since none are to judge of *Affairs* by *their tendencie*, and not by the persons that *openly* manage *them*, I doubt not but even *these persons* and *others* of *integrity* and *solid worth* will not imagine themselves concerned in the maintenance of those *Errors*, which they cannot *approve* of, and every one knows *they could not commit*, nor *hinder*.

I have been thus large in the *Preface* to remove all *umbrages* and *misconstructions* to which this *undertaking* might subject *me*: the *Preface* also against Mr. *Glanvill* may seem a little *prolix* in comparison of the *subsequent Discourse*; but the *Specimen* being lodged at *London*, partly in *transcribing*, and partly because that the distance of the *Term* made the *Edition* less *seasonable*, I thought fit to inlarge that *Preface* much during my stay at *Bathe*, and to annex those other *Observations* made there, and what else is taken out of the Disputations of *Vander Linden* about the *Circulation of Blood*, which Book I could not procure the *sight* of before.

There be many defaults in the Language, and *connexion* of *passages* which may be liable to some *censure*: But whilst the *Body of my Discourse* stands firm, the advantages which the *Comical wits* shall derive from those *peccadilloes* will not be much: especially when I shall plead that the work was written amidst the *heat* of my *practice*: that the papers were not written, nor any discourse finished at *one time*, but with *frequent interruptions*: that the several *parcels* and *fragments* were sent to sundry *Learned* persons to experiment their *judgment*; that they were *joyned together* with some *alterations* and new *connexions*, without any review *of mine*, at *London*: several *additions* being to be inserted, as they came into my mind, in divers places, and so transmitted by the *post*: which occasioned

great

great trouble: in fine, had not ſome publique ſpirited *Gentlemen* there undertook to tranſlate the *Italian* pieces, and to ſee the work *tranſcribed*, and the *inſertions* made, and the *connexion* in ſome meaſure ſupplied, I could never had leaſure to finiſh my intendments.

After this piece there ſhall follow the next *Term* (if God give me leave to perfect what is almoſt finiſhed now) *A Vindication of* Ariſtotle *from the calumnies with which* Mr. Glanvill *hath aſperſed his perſon*, in his Letter which is joyned to the Edition of his *Scepſis Scientifica*, which bears the *Arms* and is *dedicated* to the *Royal Society*, : as *as he repeats again* and *again* the *ſame* things, ſo *he* is ſtill the *ſame illiterate perſon* : having never ſo much as read over *Diogenes Laertius*.

There are alſo *three Letters* of *mine* which may at ſome time or other become *publique*. The *firſt*, to a *perſon of Honor* and Member of the *Royal Society*, ſhewing how my writing againſt theſe *Comical Wits* doth not derogate from the *perſons of Quality* who are *Honorary Members* of the *ſame Aſſembly*: eſpecially ſince *they* have acted ſo much contrary to the intentions of thoſe *illuſtrious Patriots* that at firſt encouraged *them*; there are the paſſages of *Campanella* ſet down, and *commented* uon. & the third part of the *Hiſtory of the Royal Society* animadverted upon, as being directly ſubſervient to *his Propopoſals* for the reſtoration of *Popery*, with ſome acceſſional Characters, which Mr. *Sprat*, and Mr. *Glanvil* beſtow upon the *uſeful Univerſity*-Learning.

The ſecond, to a *perſon of Honor*, no Member of the *Royal Society*, ſhews, that it is *impoſſible* to arrive at any *exact Science* in *Natural Philoſophy*; that if it were poſſible, yet theſe *Comical Wits* and their *Method* could never atchieve it: I ſhew here their *negligence* in making *obſervations*; their *falſhood* in relating them: that they either are *ignorant* of what is publiſhed by *Antient* and *Modern Writers*, or moſt *egregious plagiaries*: that the *Ariſtotelians* and *Galeniſts* were never enemies to *Experiments*, but cautious about *concluding* any thing *raſhly* from them, or making ſuch as were unſafe and inconſiſtent with a *good conſcience*: and that the *Experiments* recorded by the *Galenical*

Here I further purſue Mr. *Sprat* for the miſtakes againſt *common Licentue*, with which the *Hiſtory* abounds

Comical Physicians infinitely surpass as to *Physick*, and even *Natural Philosophy*, what ever these *Comical Wits* can pretend unto. I add, that the *deep* study of *Natural Philosophy* is not *requisite*, but rather *destructive* to all *Polities*, (as appears by *History*) neither is that or the *Mathematicks* necessary to the improvement of *Manual Trades* and *Arts*, since those *Countries* where *Philosophy* and *Mathematicks* have been *generally ignored*, (as in *Asia*, and during the times of the *Romans* luxury) *Mechanical Artisans*, and such Manufactures have *most flourished*: that the *Luxury* which is now in *fashion* hath nothing in it that may compare with the *ingenuity* of the Antient *Vertuosi*: that those of old *Rome* did make an *Icarus* to fly, and in his flight to fall down and besprinkle *Nero* with his Blood; whereas our *Fopps* have been these many years studying how to flie, yet have not so much as effected the most facile part of the attempt, which is, *to break their necks*.

The third is to a learned *Physician*, shewing the damages *our Faculty* hath sustained by these *impertinents*: the condition of *Physick* and *Chyrurgery* as it is at present by reason that the *Divines*, *Mountebanks*, *Quacksalvers*, *Apothecaries*, and every rude *Experimentator* countenanced by the *principles* and repute of these *Virtuosi*, all *practise it*: the inconveniences to the *Monarchy* thereby are considered, and the unreasonableness of what the *Virtuosi* alledge, as also the *vanity* of sundry of their *Experiments* (besides what are *old*, and *impudently* obtruded on *us* for *new*) is demonstrated.

And if there be any person *worthy of my indignation* that will justifie the *Rhetoricalness* of the *History of the Royal Society*, I will write a fourth about *that*, shewing that *choice of words*, and a *smooth* and *numerous period* is not *compleat Eloquence*; but if the Subject-matter be *foolish* and *irrational*, 'tis a sort *of madness* in the judgment of *Tully*: and that if all the instances of *puerile & jejune Eloquence* were lost, which are recorded by *Seneca* and *Quintilian*, I protest I could supply a great part of *that damage* out of this famed *History*: and if any fitting *Adversary* declare hereupon, I will make these *Comical Wits* as much renounce the *Antient Orators*, as they do now the *Philosophers*.

I ſhould here put an end to this *Introductory* diſcourſe, but that 'tis fitting the world ſhould know how not only *illiterate*, but *mean-ſpirited* theſe *Vertuoſi* are: when I declared that I would *animadvert* upon Mr. *Sprat*, and Mr. *Glanvill*, theſe *Comical wits* not only intimated to *me*, but in all places divulg'd that if I attempted any ſuch *thing*, they would appoint ſome *ingenious men of their number* to write *my Life*, thinking hereby to *terrifie* me, and make me fear their *Satyres*, who deſpiſed their *Learning* and other *abilities*. The effect of *this their project* was ſuch, that I found *all perſons of Honour* and *ingennity* to condemn it *univerſally*: pitiful *Mechanicks*, that being ſo ridiculous already, multiply occaſions of further *contempt*! The courſe is uſual amongſt the *Papiſts*, and *therefore* leſs to be admired or ſtrange in theſe *Virtuoſi*. When the Biſhop of *Spalato* writ his excellent Books againſt the *Romaniſts*, they anſwered him by *calumniating* his *life*: when *Padre Paolo* writ the *Hiſtory* of the *Council* of *Trent*, the Jeſuit *Palavicini* begins his *Anti-Hiſtory*, with a long debate, wherein he attempts to prove that the *Author* of the ſaid *Hiſtory* was an *Heretique*, and *Atheiſt*. This procedure of his hath been *laughed* at every where, and *Cæſar Aquilinius* a *Papiſt*, thus cenſures it.

Cæſar Aquilinus de tribus Hiſtoricis *Concilii Tridentini*. p. 18, 19, 20.

" An *Petrus Soave* fuerit Hæreticus an Atheus? *Queſtio-*
" *nem hanc proponit* Henricus *initio præfationis ad ſuam* Cenſu-
" ram, *loquens enim de* Petro Soave, *hæc addit*, Scriptor Hære-
" ticus an Atheiſta? *nihil oportet inquirere: quare ipſe Quæ-*
" *ſtionem hanc ut ſuperfluam contemnendam potius quam examinan-*
" *dam & determinandam judicat*. Palavicinus *vero exiſtimans*
" *ſtatim uno ictu adverſarium, atque ejus* Hiſtoriæ *ſternere autori-*
" *tatem, Quæſtionem iſtam proponit, & ſolvit, aſſerens in primo in-*
" *troductionis ſuæ limine* Petrum Soave *fuiſſe* Hæreticum, *&*
" *quod pejus eſt*, Atheum: *hoc etiam addit ſecundi voluminis in-*
" *itio in epiſtola quam tribuit ſui operis* Bibliopolæ. *Probat hoc*
" *ex quibuſdam verbis Manu ſcriptarum epiſtolarum, quæ juxta*
" *ejus ſententiam* Petro Soave *tribuuntur*. Verùm ſatis ſtultè
" videtur incedere, & aſſimulatur ei, qui umbram inſequitur
" relicto corpore: *habet præ manibus* Hiſtoriam Concilii Tri-
" dentini *ſcriptam ab illo & typis datam, in qua tanquam in ſpe-*

culo

"*culo poſſet cognoſcere, quænam ſit* Petri Soave Religio. *An Ca-*
"tholicus, *an* Hæreticus ? *An fortaſſe* Atheus ? *& laborat a-*
"*pud nonnulla privata manu ſcripta, quæ vel vera non ſunt, vel*
"*certe ancipitis expoſitionis.* —— *Primus igitur* Palavicini
"*ictus ſatis* vanus *&* inutilis *eſt, & ipſe videtur aſſimilari ho-*
"*mini, qui cum non valeat* ſuis viribus *inimicum vincere, utitur*
"*clarioribus*, *&* maledicis vocibus : *debuiſſet ſolum reſpondere*
"*ad oppoſita, quæ in illius* Hiſtoriâ *inveniuntur, & non laceſſere*
"*hoſtem injuriis &* imitari prudentiores, *ac* Sanctos Scriptores
"*adverſus* Hæreticos, *qui relictis injuriis tantum eorum doctri-*
"*nam confutant ac damnant.* ——

In fine, I was ſo far from being daunted at *thoſe rumors* and *threats*, that I enlarged much *this Book* thereupon, and reſolved to charge the *Enemy* home, when I ſaw how *weak reſiſtance* I ſhould meet with. I knew that *recriminations* were no *anſwers*; and that a *ſober vertue* needed not to ſtand in fear of any *aſperſions*. I underſtood well that the paſſages of a *life* like *mine*, ſpent in *different* places with much *privacie* and *obſcurity*, was *unknown* to *them*; that even thoſe *actions* they would fix their greateſt *calumnies* upon, were ſuch as that they underſtood not their *grounds*, nor had they *learning* enough and *skill* in *caſuiſtical Divinity* to *condemn* : that it would be *imprudent* in *them* to look beyond the *Act* of *Indemnity* and *Oblivion*, which was more neceſſary to many of the *Royal Society* than to me; nor can *their deportment* be *juſtified*, as *mine*, who joyned with *no party*, frequented no *Conventicles*, writ very *honorably* concerning the *Epiſcoparians*, and pleaded for their **Toleration* : I was at *Weſtminſter-School* when the late *King* was *beheaded* : I never took *Covenant*, nor *Engagement*. In ſum, I SERVED MY PATRON; I endeavoured to expreſs my *Gratitude* unto *him* who had *relieved me* being a *Childe*, and in great *poverty* (the *Rebellion* in *Ireland* having deprived my Parents of all means wherewith to *educate* me) who made me a *King*'s *Scholar*, preferred me to *Ch. Ch. C.* in *Oxon.* who often ſupplied me with money, when my *tender years* gave him little hopes of *any return*, and who protected me amidſt the *Presbyterians* and *Independants*, and other *Sects*, with none thereof did I con-

'Tis a kind of *Impiety* to diſturb the buried : and oftentimes the expoſing of things to the Air that have been long kept *cloſe*, or the *opening of Tombs*, hath raiſed vapours ſo *peſtilential* thas they have *almoſt ruined flouriſhing Kingdoms* and *Seigniories*.

* See my preface to the *Good Old Cauſe*.

contract any *relation* or *acquaintance*: my *familiarity* never engaged me with *ten* of that *party*, and my *genius* and *humor* inclined me to *fewer*. *I* neither *enriched*, nor otherwise *advanced* my self during the *late troubles*, and shared the common *odium*, and *dangers*, not *prosperity* with my *Benefactor*. *I* believe no generous man, who hath the least sense of *bravery* will *condemn me*; and *I* profess, *I* am ashamed rather to have done *so little*, than that *I* have done *so much* for *him* that so *frankly obliged* a *stranger*, and a *childe*. When *Gracchus* was put to death for *sedition*, that faithful friend and *complice* of *his* was *dismissed* and mentioned with *honour* by all Posterity; who when he was impeached, *justified his Treason* by the avowing a *Friendship* so great, that whatever *Gracchus* had commanded him, he would not have declined it: and being further Questioned, *Whether he would have burned the Capitol at his bidding*? He replied again, *That he should have done it*; *but* Gracchus *would not bid such a thing*. They that knew *me* heretofore, know I have a *thousand times* thus apologized for my self: adding, that in *Vassals* and *Slaves*, and persons *transcendently obliged*, their *Fidelity* exempted them from *all ignominy*, though the principal *Lords*, *Masters*, and *Patrons* might be accounted *Traytors*. And *I* am so far from dreading the *Censure* of the *world* (especially from *Cavaliers*) that *I* believe most men wish their favours so well placed, and that in their *exigencies* they might meet with as *brave* acknowledgments. My *Youth* and other circumstances *incapacitated* me from rendring him any great *Services*; but *all that I did*, and *all that I writ*, had no other aim than *his interest*; nor do *I* care how much any man can *inodiate my former Writings*, as long as that they were *subservient* to *him*.

* * *

I think this defence to be the most *proper* and *seasonable* that I can now make; and *I* will not suffer my self to be engaged in any *Disputes* that may contribute to the *dissettlement* of this *Nation*, and *Monarchy*; it will therefore be but meanly done

to

to *assault* what *I now abandon*; and to revive the *mention*, nay, perhaps to contrive *any answer* (after so many years omitting it) is scarce *prudential*. *I* have been *confirmed* by the *Right Reverend father in God* the Lord *Bishop* of *Winchester*, and they that would write *my life well*, must consult that excellent *Prelate*, and a Letter which *He* hath of *mine*: *I* have lived in *Communion with the Church of England hitherto*, as standing upon the foundations laid by Qu. *Elizabeth*; and my neighboring *Dioceſans* of *Worceſter* and *Lichfield* can certifie with how much reſpect I have demeaned my ſelf *to them* upon occaſion; and *I* abhor all *thoughts* but ſuch as ſhall contribute to the *ſupport* of the *Monarchy*, the *Proteſtant Religion*, the *Honor* and *welfare* of *theſe Kingdoms*. Having made this Declaration, let them (or more able men than *they*) write againſt any piece of mine which hath been publiſhed ſince his *Majeſties reſtoration*, and conſider the *mannner of my aſſertions*; and let them write the life of a *man* who hath *ſome vertues* of the moſt *celebrated* times, and hath reſerved himſelf free from the *Vices of theſe*, *I* ſhall not regard their malice, nor value the *indulgence* of a ſort of people whoſe credit (ſince the Anſwer to Mr. *Sorbier*, the *Hiſtory of the R. S.* the *Calumnies* againſt *Ariſtotle*, and the *Plus Ultra* of Mr. *Glanvill*) cannot equal that of *Amadis de Gaule*, King *Arthur*, *Timæus*, or *Schioppius*. All that *they* ſhall ſay of this *nature* will be *notorious*, and *illiterate malice*; and my Reply ſhall be a *ſcornful ſilence*.

I ſhall add now, that in ſuch times as I thought it *our intereſt* to ſubvert the *Monarchy* of *England*, and the repute of the *Clergy*, I was paſſionately addicted to the *new Philoſophy*, and motioned ſeveral ways for the introducing it amongſt the *Gentry* and *youth* in this Nation; I was confident that it would render all the *Clergy* contemptible, and take from their *eſteem* and *reverence* in the *Church*, whilſt they muſt ſeem *egregious fools* in matters of *common diſcourſe*; nor did *I* queſtion but the *Authority* of all *Antiquity* in ſpiritual affairs would vaniſh when it appeared how much they were miſtaken in the *common occurrences* and *Hiſtories of Nature*. How rational this opinion of *mine* was, and how it is verified in theſe days, let the *Hierarchy* and *Univerſities* judge.

To

To the two famous *Universities* of this Land, *Oxford* and *Cambridge*, the *Chancellors*, *Vice-Chancellors*, *Heads* of *Colledges* and *Halls*, *Professors*, *Fellows*, and *Students* in the same,

Reverend *Fathers* and *Gentlemen*;

THe *goodness of the* Quarrel *I am engaged in makes me fear no* Judges; *but yet to chuse the most* competent: *I am* secure *of the honest and* true; *but submit the* decision *to the* learned *and* prudent. *All that are sensible of those* studies *by which the* Morality, Religion, *and* Civil Policy *of this* Nation *hath been carried on* happily *before these* Impertinents & Innovators; *and how* this Nation *is declined and* debauched *from every thing that is* serious *and* sober *now*, *are convinced of the* justice *of* my complaints, *and how* necessary *it was that* some body

body *should attacque* them ; *but it is for* you *to determine of the* validity *of my* charge, *and of those* proofs *with which I come to implead* them. *I am not* troubled *at the* glorious Titles *with which these* Comical Wits *boast themselves ; Of the* Lyons *which they* bear, *they have only* this *faint* resemblance, *that* they are not so brave as they are painted *I have stooped the* Talbots (*your* Supporters) *for* them, *and if they ever* hunt well *hereafter*, this Age *knows* whom *they are* obliged *unto. The name of* Virtuoso *signifies as little with me, as it does in* Italy, *where they will bestow on a* Pastry-Cook *or* Millener, *even with that* fair *accessional of* molto Illostre; *But it seems a little too* open *and* palpable *to fetch the* project *of the* Society *from* Italy ; *and their* name *too : though* Campanella *contrived the* former, *yet would* He *not have advised* them *unto the* latter ; *and if their*

their invention were so barren *as not to suggest unto* them *a fitting* denomination, *they might without robbing* meaner Artizans, *have borrowed* one *from the* Academy *of* Perugia, *or some where else there, and stiled themselves the* INSENSATI, &c. *It is manifest now that the* Antient Learning (*and not only the* Natural Philosophy) *is the* Rubbish they would remove; *This work they have so diligently pursued, as if they had forgot* "*Their* first and chief Employment, "carefully to seek, and faithfully to "report how things are *de facto* —— *This* Specimen *acquaints* you *with what* integrity *they perform their* undertakings; *and if the* Ensamples *they exhibite to the world, whilst* They *are yet* probationers *for the glory of* Natural Philosophers, *if they be so* faulty. *what* estimate *may we* rationally *make of those that are laid up in the* Treasu-

Mr. *Glanvill* pag. 91.

ry *of their* Archives? Mr. Glanvill *tells us, that* "They have done more "than all the Philoſophers of "the notional way, ſince *Ariſtotle* "opened his ſhop in Greece: which "ſaying (*he adds*) may perhaps look "to ſome like a bold and fond ſen- "tence; but whoſoever compares the "*Repoſitory* of this *Society*, with all "the volumes of the Diſputers, will "finde it neither immodeſt nor un- "juſt; and their Hiſtory hath given "us inſtances ſufficient of their *Ex-* "*periments* and *Obſervations*, and *In-* "*ſtruments* to juſtifie a bolder affir- "mation. ----- *I am indeed apt to be- lieve that all the* Philoſophers *of the* notional way *in* Greece, Alexandria, *A*rabia, Spain, *and the reſt of* Europe, *neither have, nor would have attempted any thing* like to what they have done; *and when I reflect upon the lamentable narratives and propoſals which their Hiſtory,*

pag. 90.

I ſhall hereafter give the world an examen of the reſt of the *hiſtory*: and I, deſign to try them by that piece.

History, the Transactions and other Books of theirs represent unto us, I think they purpose to grow famous, as the Turks *do to gain Paradise, by treasuring* up all the waste paper they meet with. *But I shall not anticipate* your censure, *nor endeavor to prepossess* you *against* them *by the sense of* your interest, *nor exasperate* your passion *any way: Be as* unbyassed *as it is possible; Be as* Loyal *and* Monarchical, *as any* English-man *imaginable; Be as great* friends *as* you *can to the* Protestant Religion, sober vertue, *and the* real Honor *and* utility *of* these Kingdoms; *I wish for* such Arbitrators; *and your* Sentence *shall never be declined upon* those accounts, by

Warwick *Octob.* 6. 1669.

Your affectionate humble Servant.

Hen. Stubbe.

A

Specimen of the *Animadverſions* upon the Hiſtory of the *Royal Society*.

Epicurus and thoſe of *his followers* which declined the (*a*) entermedling with ſuch employments as related unto the *Government* of their *Countrey* and *Civil Policie*, did agreeably to *their* inclinations and principles, ſlight and vilifie all that παιδεία or (*b*) *courſe of ſtudies* conſiſting of *Grammar* (which in its extent included all *Critical Learning*, *Hiſtory* and *Chronology*) and *Rhetorick*, and *Logick*, and even *Mathematicks*. That great *Epicurean Philoſopher Metrodorus* had the confidence to (*c*) write unto one, that *whereas he was ignorant of the firſt Verſes in* Homer, *and underſtood not whether* Hector *were a* Trojan *or a* Grecian *Commander, nor any of thoſe things almoſt which were the ſubject of common diſcourſe and knowledg, yet he ſhould not be* troubled *thereat*. We have ſeen in *this Age* not only the *Philoſophy*, but the *Ignorance of that Sect* revived, but with this *diſparity*, that wheras the *former Epicureans* did own & avow their being *unacquainted* with that ſort of *Literature*, our *Modern Inſolents* pretend to underſtand *it* in ſuch perfection, that the *Empire of Learning* as well as of *wit*, and *ſolid Philoſophy* ſhould ſeem included in the *ſame walls*. But how *vain* ſuch their *pretenſions* are, and how juſtly I charge *them* with the *imputation* of *ignorance*, is apparent to any that are converſant with the *Books* that wear *their Name*, and by their *ordinary Diſcourſes*. I ſhall vindicate my *Cenſure* by inſtancing in *thoſe pieces* which had more than one *Comical Wit* to pen *them*, and *which* if they be not the moſt *elaborate* & *ſubſtantial* that it is poſſible for *that ſort of men* to produce, the world muſt ſuſpect henceforward *their diſcretion*, as much as now their *abilities*. The *Hiſtory* was *many years* in writing, and the *Author* aſſures us, he had no *mean aſſiſtants* in that work: Mr. *Glanvill* wanted not a *convenient*

ſpace

(*a*) Vide *Diogen. Laert.* l. x. & notas *Menagii* pag. 275.

(*b*) Vid. *Diog. Laert.* ubi ſupra. *Menagii* notas pag. 260. 274. & *Voſ.* de Phil. Sect. c. 8. *Sect.* 2, 3, 7.

(*c*) *Plutarch.* in libello *quod non poteſt ſuaviter vivi ſecundum Epicurum.*

ſpace of time to perfect his *Plus ultra*; he conſulted with ſeveral of the *Virtuoſi* for materials wherewith to advance their *Renown*, and ſilence not only his *opponent*, but all *oppoſites* againſt the *Royal Society*. I know ſome that *he* writ unto about it; and others ſaw *his papers* as they were remitted unto him, *blotted* and *altered*. The reſult of all which *their care* and *pains* is, that whereas *ſome* only *imagined* that *theſe men* were a company of *talkative* and *ſuperficial* —— now it is become *paſt denyal* by any body. Who can with *any patience* read how this famous *Society* ſent to the Governor of *Batavia* in the *Eaſt-Indies* to know what grows in *Mexico* in the *weſt-Indies*? How poor and mean are their *inquiries*, not ſuch as *ſerious men* deſign to erect a *Natural Philoſophy* upon, but to yield *empty fellows*, and the *Impertinents* matter for *Table-talk*! Juſt ſo when I went to *Jamaica* and deſired that Honorable Perſonage Mr. *Robert Boyle* to procure me *ſome directions* for *Philoſophical* inquiries in *that Countrey*; He, with *bluſhing and diſorder*, tendered me from *them* a *ridiculous* paper which concerned moſt ſome particularities of *China*, and thoſe *Oriental* parts: Had not that paper been *loſt*, I would have printed it; but if *they* pleaſe to remember *it*, it is about *half a ſheet of Inſtructions* given to an *Eaſt-India* Captain, and beyond any *Almanack* were to ſerve for all *Meridians*, and *Countreys*, though the enquiries were *ſpecialties*. I can ſcarce endure to hear Mr. *Sprat* tell us, that the *graver and more reſerved Ægyptians did confine their Philoſophy to their Temples*. There is a great noiſe made by ſome concerning the antient *Hieroglyphical* Learning of the *Ægyptians*; but I never heard that it was *confined* to their *prieſts* by the *graver Authority*; but rather that a company of *cheating lying Rogues* did make *fools* of the *people*, and by pretences of a *ſacred* and *myſterious Character* amuſed them: they had little of *Natural Philoſophy*; ſomewhat more of *Geometry* and *Aſtronomy*: all their *Knowledge* amounted not to much, as *Conringius* hath (*d*) demonſtrated; and after that the Suceſſors of *Alexander* had ſetled themſelves in *Ægypt*, that *foppery* decayed, & the grave *Ægyptians* at *Alexandria* endowed the profeſſors of *Phyſick* and ſundry *Philoſophies* there, (the place or Colledge

pag. 170.

Pag. 7.

d Conringius de Medicin. Hermeticâ.

was

was called *Muſeum*, *Strabo lib.* 17.) and erected *Libraries*, and furniſhed the *Roman* Empire with *Phyſicians* to the days of *Valentinian*, and (*e*) *Domitian* with Books.

But it were *unpardonable* in a common *School-boy* to paſs by the *Jonique* and *Italique Philoſophers* un-mentioned; and to tell us, "*That in* Greece *the moſt conſide-*
"*rable* (*and indeed the only ſucceſsful*) *trials*
"*were made at* Athens? Whereas, if we regard *Natural Philoſophy*, and abſtract from the Experiments of the *Ariſtotelians*, there was never any thing in *Athens* could compare with the diſcovery that *Thales*, *Anaximander*, *Anaximenes* and *Anaxagoras* made, which were of the *Jonique* Sect: and ſince the *Dialect* in which he *writ* (not the place of his Nativity) authorizeth me to do it, I ſhall reckon *Hippocrates* amongſt the *Jonian* Philoſophers, and Mr. *Sprat* may be certain *he* is not to be accounted for in *Athens*. And as to the *Italique* and *Eleatique* Sects, dare any man ſay *they*, that they were inferior to *Athens*, or that their trials were *un-ſucceſsful*; who knows the performances of *Pythagoras*, *Empedocles*, *Acron*, *Parmenides*, *Meliſſus*, *Leucippus*, *Democritus*, *Ocellus*, *Lucanus*, *Archytas*, *Archimedes*, &c? At *Alexandria* (a place we may not improperly reckon in *Greece*, ſince not only Mr. *Sprat* omits the mention of thoſe Profeſſors as *Ægyptians*; but they writ in *Greek*, followed the *Grecian* (*f*) account and cuſtomes, not *Ægyptian*; and as *Athenæus* ſhews (*lib.* 4.) taught *Greece* it ſelf Philoſophy and the *Liberal Arts*) if we remember that it was the ſeat of (*g*) *Euclid* the *Mathematician*, and there is ſcarce one *Mathematician* recorded but was related to *Alexandria* as *Voſſius* ſhews. "*Valde autem illud com-*
"*mendat Scholam ab* Euclide *erectam* A-
"lexandriæ, *quod non ſolum multos reli-*
"*querit diſcipulos*; *de quo auctor* Pappus *in ſeptimo collectionum*
"*Mathematicarum*; *ſed ab ejus tempore, uſque ad tempora* Sarracenica,

e Domitianus —— miſitque *Alexandriam* qui exemplaria deſcriberent; emendarent. Ita diſcimus tempore *Domitiani* non caruiſſe Bibliotheca Alexandriam; nam ſemper *urbs illa* profeſſores plurimos aluit. *Pagnin. Gaudent.* de Philoſ. apud Roman. c. 168. p. 456.

pag. 7.

I believe the *Cyrenaic Philoſophers* in the Court of *Dionyſius* made *very ſucceſsful Experiments*: and their number is paralelled by *Lypſius* (if my memory fail me not) in his *Stoical Manuduction*, to any that *Athens* ever ſaw.

f Conring. de Med. Hermet. c. 12. pag. 152.

f Euclides Mathematicus floruit temporibus Ptolomæi Lagidæ, eoque regnante primus Alexandriæ docuit *Matheſin*: ut ex *Proclo* diadocho videre eſt. *Voſſ.* de Phil. Sect. c. 11. Sect. 1.

" cenicâ *vix ullum invenire ſit nobilem Mathematicum; quin*
" *vel patria fuit* Alexandrinus; *vel ſaltem* Alexandriæ *de-*
" *derit operam Matheſi.* Voſſ. de Scient. Mathemat. c. 15. pag.
" 52. The ſame is avowed by Sir *Henry Savil* in his ſecond
" Lecture. " *Poſt* Euclidem *enituit* Archimedes —— *&* E-
" ratoſthenes. *Hos inſecuti* Apollonius Pergæus, Geminus,
" Theodoſius, Menelaus *Geometra dictus, & alii ex Schola fere*
" Alexandrinâ *profecti omnes, uſque ad tempora* Sarracenorum. There flouriſhed *Herophilus* and *Themiſon*, and *Dioſcorides*, and many other Profeſſors of *Phyſick*, *Anatomy*, and *Philoſophy* (even *Chymiſtry*, and the *Philoſophers-ſtone*) 'tis *extreme imprudence* to mention *Athens* thus! But, to gratifie him further than *he* deſerves or can expect; to yield that up to *Ariſtotle* and his *Peripatetick* followers in *Athens* which cannot ſeem due to ſuch as (*b*) ſpent their time *in idle talking and wandring under the fruitleſs ſhadows* of nature, in *their firſt inſtitution, (as their ſucceſſors have done ever ſince) and were utterly uſeleſs in reſpect of the good of man-kinde.* To grant our *Virtuoſo* more than the *walks*, *porches*, and *gardens* he prates of, do merit, what a ſtranger is *he* in the *Hiſtory of Philoſophy*, and how ignorant of the *Subject he diſcourſeth about*, not to know what *Dialects* the *Grecian* Philoſophers *writ* in, nor how *elegant* was their *ſtyle*? Some uſed the *Jonique*, others the *Dorique* dialect, and thoſe *embaſed* ſeveral ways according as *their humors*, their *Countreys*, or the *novelty of the Subject* put them upon it: And even at *Athens*, neither the *Stoiques*, nor *Epicureans* were ſo ſolicitous about *Rhetorick*, as to chuſe that for *Philoſophy* which they could moſt *eloquently* expreſs. And ſince *Plato* had his λέξεις, and *Ariſtotle* his ἐνδελέχεια and other *terms* and *expreſſions*, 'tis hard to think that they did ſo regulate their *Philoſophy* by their regards to the *ornaments of ſpeech*, as Mr. *Sprat* imagines. How comes it to paſs then that our *Hiſtorian* intimates to us ('tis a " new *invention*! to give the *Co-*
" *mical Wits* their due, though fooleries) that the *Athenians*
" *were the* (i) *Maſters of the Arts of ſpeaking to all their Neigh-*
" *bours* [which is falſe concerning the *Jonians*, and probably
" of ſome others] *and ſo might well be inclined, rather to chuſe*

Mr. *Sprat*. pag. 327, 817.

i Did the *Athenians* teach *Hippocrates*, or *Democritus* to

ſuch

"*such opinions of Nature, which they might* "*most elegantly expreſs, than ſuch which* "*were more uſeful, but could not ſo well be* "*illuſtrated by the ornaments of Speech.*

Mr. *Sprat* further *informs* us, (and who can deny him to *glory* of being the firſt *diſcoverer* ?) that "*in the City of* Athens "*the knowledge of Nature had its Original* "*before either that of Diſcourſe, or of hu-*"*mane Actions.*—— This is notoriouſly falſe; for it is manifeſt that *Anaxagoras Clazomenius* firſt brought from *Miletum* news of *Natural Philoſophy* to *Athens*, teaching it to *Pericles* and *Euripides* : and before *that time* there were *Orators*, and Moral *Philoſophers*, as certainly as ever there was a *Solon*, or (*l*) the *Sophiſtæ* at *Athens*.

I muſt profeſs here in the *Introduction* that 'tis *an hard thing to write againſt men that underſtand nothing* : and that it is not my preſent intention to manifeſt *all* thoſe miſtakes againſt *common reading* and *Literature*, which are in that *Hiſtory*. I ſhall inſiſt *now* but on *ſome*, but ſuch as are ſo *groſs* as to juſtifie the moſt harſh of *my cenſures*, and to gain a belief from my *Reader*, that thoſe *who could not prevent theſe faylors* may be guilty of an infinite more. I appeal unto my *Reverend* and Learned School-Maſter Dr. *Busby* at *Weſtminſter*, whether he, or any other Learned man, would have admitted of, much leſs have *applauded* ſuch an *Exerciſe* as Mr. *Sprat* offers to his *Majeſty* by way of *Dedication* ? Do a few *empty* though *ſmooth-placed words* make up *all Rhetorique* ? Is this *Nation* ſunk *ſo low*, that *non-ſenſe* and *ignorance* can be *voiced* for the moſt *Exemplary Eloquence* that late years have publiſhed ? *Oratio, ſi res non ſubeſt ab oratore percepta & cognita, aut nulla ſit neceſſe eſt, aut omnium irriſione ludatur. Quid enim tam furioſum, quam verborum vel optimorum atque ornatiſſimorum ſonitus inanis, nulla ſubjecta ſententia aut ſcientia* ? The Epiſtle follows, and is *this*.

write ? did *theſe two ſhew* ſo great a care of *eloquent language* that they choſe their *Philoſophy* accordingly ? Or did not the one in the *Ionique*, the other in the *Dorique* phraſe joyn many *words* and expreſſions thereby to deſcribe their *Philoſophical ſentiments*. Read over, Oh ! *tres-haute* & *tres-agreeable virtuoſi* Diogenes Laertius, & *Foeſius* before you tell theſe Stories.

pag. 8.

k Voſſius de Phil. Sect. c. 5. Sect. 7.

l Iſocrat. in orat. περὶ ἀντιδόσεως.

Cicero de orator. l. 1.

The Dedication of the History of the Royal Society unto his Majesty.

To the King.

SIR,

OF *all the Kings of* Europe, *Your Majesty was the first, who confirmed this Noble Design of* Experiments, *by Your own Example, and by publick Establishment. An* Enterprise *equal to the most renown'd Actions of the best* Princes. *For, to encrease the Powers of all Mankind, and to free them from the Bondage of Errors, is greater Glory than to enlarge* Empire, *or to put Chains on the Necks of Conquer'd* Nations.

What Reverence all Antiquity *had for the* Authors *of* Natural Discoveries, *is Evident by the Diviner sort of Honor they conferr'd on them. Their Founders of* Philosophical Opinions *were only admir'd by their own* Sects. *Their* Valiant Men *and* Generals *did seldom rise higher than to* Demy-Gods *and* Heroes. *But the* Gods *they worshipped with* Temples *and* Altars, *were those who instructed the world to* Plow, *to* Sow, *to* Plant, *to* Spin, *to* build Houses, *and to find out* New Countries. *This Zeal indeed, by which they express'd their Gratitude to such Benefactors, degenerated into Superstition: yet has it taught us, that an higher degree of Reputation is due to* Discoverers, *than to the* Teachers *of* Speculative Doctrines, *nay, even to* Conquerors *themselves.*

Nor has the True God *himself omitted to shew his value of* Vulgar Arts. *In the whole History of the First* Monarchs *of the world from* Adam *to* Noah, *there is no mention of their* Wars, *or their* Victories: *All that is recorded is this, they liv'd so many years, and taught their Posterity to keep* Sheep, *to till the* Grounds, *to plant* Vineyards, *to dwell in* Tents, *to* build Cities, *to play on the* Harp *and* Organs, *and to work in* Brass *and* Iron. *And if they deserved a* Sacred Remembrance *for one* Natural *or* Mechanical Invention, *Your Majesty will certainly obtain* Immortal Fame, *for having established a perpetual Succession of* Inventors.

I am, &c.
THO. SPRAT.

Animadverſions upon the Epiſtle *aforeſaid.*

IT is a ſign that our *Virtuoſo* is little acquainted with the condition of *Europe*, and that the Intelligence of theſe *Curieuſe* is as bad or worſe than ever deceived the *Man of Stagyra*, in that he ſays, that *of all the Kings of* Europe *his Majeſty was the firſt, who confirmed this Noble deſign of Experiments by his own example.* —— Had not the Emperor *Rudolphus* a Colledge of *Chymiſts* to promote *Natural* and *uſeful Experiments* in *Phyſick* and *Philoſophy*, did he not oftentimes *work* himſelf in thoſe *Laboratories* where they had *Rulandus* and others for his aſſiſtents? take the teſtimony of one that was *preſent* with him. *Nec attinet ſuperiorum annorum Imperatores, Principes, & totam Nobilium familiam citare; cum manifeſtiſſimum ſit, multum ſtudii, laboris, diligentiæ atque ſumptuum in nobiliſſimam hanc artem* [Chemiæ] *collocaſſe Auguſtiſſimum noſtrum Cæſarem* Rudolphum *adducere licebit, quem publica fama paſſim conſtat, artem hanc Alchemiæ impenſe amare, artificiumque ſtudioſe de his exquirere, non raro ipſa* Chymica *aggredi, tractandaque nec dedignari.* —— Did not *Alphonſo* the laſt King of that name in *Naples* try many *Experiments* in his *Gardens*? and when he poorly abandoned his Countrey and Riches to the *French*, did he not (admire him, O ye *Comical Wits*!) did he not with ſeveral *choice Seeds* remember to ſhip ſome excellent *Bottles of Wine*, and ſo retired to *Sicily*? Did not King *Charles* the Firſt encourage and aſſiſt Dr. *Harvey* in the Diſquiſitions about the *Circulation of the Blood*, and *Generation of Animals*? Hath not there been at *Florence* an *Academy* for *Experiments in all manner of Philoſophy* promoted and kept on foot by the *Ducal Family*? Is there not, by the encouragement of the *Popes*, a *Laboratory* and Colledge of *Jeſuits* at *Rome*, whoſe great work hath

Mr. de *Silhon* in the ſecond part of his *Miniſter of State*, diſc. 7. obſerveth, but commends not the *Emperor Rudolphus*, in that he made a *Shop* and *Forge* of his Cabinet, and reduced all his *Imperial* thoughts into the ſearch of the Philoſopher's-ſtone, and to make *Watches* and *Dyals*.

Martin. Ruland. in dedic. ad progymnaſm. *Alchemiæ.*

hath been for *many* years to enquire into all *natural Curiosities*? is it not there that *Schoinerus*, *Kirscherus*, *Ricciolus* and others have flourished before ever this *Royal Society* was thought upon? How long hath the Duke of *Holstein* kept up his *Laboratory* and *Chymical Colledge* at *Gottorp*? If all these be not *Crowned heads*; yet there are enough of *them* to take off from the generality *of the assertion* made by our *Virtuoso*; and the rest serve to extenuate the *complement*: But if I had gone about to reckon the *Cyrenaic* Academy under *Aristippus* at *Sicily*, and the Colledge of *Virtuosi* under *Petronius Arbiter* in *Rome*, as the establishments of *European* Princes; *Dionisius* and *Nero* had quite spoiled the flattery of this saying: yet any one that hath read *Plutarch*, *Suetonius*, or *Martial*, can tell the exploits of those *Mechanick* Philosophers, and how *they* depraved one of the best *Emperors* in the world.

Read the life of *Nero* in *Suetonius*, and reflect upon it.

As for the *publique Establishment of these experimental Philosophers*, I do grant that our *King* was the first that did such a *thing*: but the formality of a *Charter*, their *President* and *Mace*, and other such circumstances make more for their *Grandeur*, than the *King*'s *glory*, except that the usefulness of the design appear: the *ignorance* and *folly* of these *Comical Wits*, the *Members* of it hath more of *disgrace* in it, than there is *honour* in the *whole foundation*; it being more for his *prejudice* that it should be proclaimed abroad (as 'tis by this *Historian* and Mr. *Glanvills* writings) that our *Nation* are *a generation of illiterate fools and Coxcombs*, than 'tis for *his credit* that they have *inutile and insignificant desires after knowledge*.

" *An enterprise equal to the most renowned actions of the best Princes.* —— I have oftentimes reflected upon those *Actions* whereby Princes have acquired the *fame* of *great*, and *good*, but I never found any that gained either of those *Elogies*, by any *knick-knacks* of *Experimental* or *Mechanical Philosophy* alone: there have been some that making some of these inquiries of their *innocent divertisement*, & by doing all those actions which gain a repute of *political wisdom*, *courage*, *justice*, *piety*, *&c.* have transmitted an *honorable memory of themselves*: but these *tranghams* as they are contra-distinct to *sober* and *substantial*

vertue,

vertue, are ſo far from being *Actions equal to the moſt renowned enterpriſes* of the beſt *Princes*, that they do not expiate for other *their faults*: as any man may learn from the lives of thoſe *infortunate* Princes, *Dionyſius* and *Nero*. What writer advanceth the *repute* of *Alphonſo*, or juſtifies him for *murthering* and *oppreſſing* his *Subjects*, and loſing his *own*, whilſt he kept his *Garden*? Is *Diocletian* more famous for thoſe *ingenuities*, or infamous for his *perſecution of the Chriſtians*? I do not think that the *eſtabliſhment of this Society*, (had all things anſwered *mens wiſhes*, and out-done *their hopes*.) would have been mentioned with ſo *much honour* as the moſt *renowned actions of the beſt Princes*: ſince the *actions* that relate to *goodneſs* and *piety* admit of *no compariſon*, (being of different *Natures* and *kinds*); but when a fool, (as here a *Virtuoſo*) holds the Scales. I ſhould not pardon my ſelf, ſhould I oppoſe the Heroicalneſs of this *enterpriſe*, with the actions of *Conſtantine* raiſing *Chriſtianity*; with thoſe of *Juſtinian* or *Theodoſius* in compiling their *Codes*: with the actions of our *Black Prince*, or *Henry* the *Fifth*: or with *Henry* the *Eighth* in *demoliſhing Abbies*, and rejecting the *Papal Authority*; or Queen *Elizabeths* exploits againſt *Spain*: or her reſtoring the *Proteſtant Religion*, putting the *Bible* into *Engliſh*, and ſupporting *the Proteſtants beyond Sea*: It is not for any man that pretends to be an *Ariſtotelian*, to make ſuch *compariſons*; much leſs to to infer as Mr. *Sprat* does. But the *reaon* which he gives why the *eſtabliſhment of the Royal Society of Experimentators equalleth the moſt renowned actions of the beſt Princes*, is ſuch a pitiful one as *Guzman* de *Alfarache* never met with in the whole extent of the *Hoſpital of Fools*.

"*For, to increaſe the Powers of Man-*
"*kinde, and to free them from the bondage*
"*of Errors, is greater glory than to enlarge*
"*Empire, or to put Chains on the necks of Conquered Nations.* ——

Theſe *Conſequences* are twiſted like the *cordage* of Ocnus

I Would fain know whether the making of a Golden-Chain of 43 Links to the chain, the Lock and Key being faſtned and put about a fleas neck, ſhe drew the ſame, all which, Lock, Key, and Chain weighed but one grain and an half; as *How* relates in his Chronicles of Queen *Elizabeth*. *Ann. Regn.* 18. 1576. yet whether did his invention (ſurpaſſing all ever heard of the *R. S.*) render *Mark Scaliot* (the author) equal in *glory* or *renown* to his *Sovereign Princeſs* and her *beſt* or *moſt* famed *actions*; neither is it voyced as the moſt *important* atchievement of her *Reign*, though it were an *unuſual improvement of the Powers of Mankinde*, over Rebellious and vexatious *Fleas*.

Ocnus (the God of ſloth) in *Hell*, which are fit for nothing but *to fodder Aſſes with*. If our *Hiſtorian* mean by every *little invention* to *encreaſe the Powers of all Mankinde*, as an enterpriſe *of ſuch renown*; he is deceived: this *glory* is not due to ſuch as go about with *a dog and a hoop*: not to them which keep *dancing Horſes and Bears*; not to the practiſers of *Leger-de-main*, or upon the *high* or *low rope*, not to every *Mountebank* and his man *Andrew*: all which with many other *Mechanical* and *Experimental Philoſophers*, do in *ſome ſort* encreaſe the *Powers of Mankinde*; and differ *no more* from ſome of the *Virtuoſi*, than a *Cat in a hole* doth from *a Cat out of an hole*; betwixt which that inquiſitive perſon *Asdryasduſt Toſſoffacan*, found a very great reſemblance. Neither is it worth the while to go about to diſ-abuſe Man-kinde about *every little error*: to rectifie every *vulgar miſtake* about *natural Phœnomena*, this is an enterpriſe *God* never delegated any man unto; *Moſes* who was faithful in all his *Reiglement* omitted the *contrivance* of our illuſtrious *Society*: Chriſt and his *Apoſtles* mentioned it not, but were content by their Language to countenance thoſe *Vulgar Locutions*, the Refutation whereof is now ſo *Renowned* and *Important*. It is the Utility of *Inventions* that acquires a *Value* to them. 'Tis not the encreaſing of the *Powers of Man-kind* by the project of a *Diving-bell*, which our Nation holds Equivalent *to the ending of a War, at the firſt Battle*. 'Tis not a *Pendulum Watch*, nor *Spectacles whereby divers may ſee under water*, nor the new *Ingenuity* of *Apple-Roaſters*, nor every *Petty diſcovery* or Inſtrument of Ingenious Luxury muſt be put in compariſon, much leſs be preferred before the *Protection*, and *Enlargement of Empires*.

" *That all Antiquity had ſuch a Reverence for the Authors*
" *of Natural diſcoveries, as to beſtow a Diviner ſort of Honour*
" *upon them, that the* Gods *were Worſhipped with* Temples *and*
" Altars, *were thoſe that inſtructed the World to* Plow, *to* Sowe,
" *to* Plant, *to* Spin, *to* build Houſes, *and to find out* New Coun-
" tries. ——— This is a tale hath ſo much of Ignorance in it, that I believe no School-boy ever uttered the like. The Task is *difficult*, if not *impoſſible* to ſtate the ſeveral diſtinctions

of

of the *Paynim Gods*, and to *adjuſt* unto them *their Honors*, according as they are diſtinguiſhed into *Dii Longentes* or *Majorum Gentium* : and the *Semi-Dei* and *Heroes* and the *Semones* : It is true that amongſt the *principal Gods* theſe are recounted,

The *Dii Majorum Gentium*, or thoſe whom *Tully* reckons upon as having gained a worſhip generally before the world was aware, and he oppoſeth them to ſuch as by their *merits* gained adoration : ſo that they were not worſhipped as Inventors.

—Juno, Veſta, Minerva, Ceres, Diana, Venus, & Mercurius, Jovis, Neptunus, Vulcanus, Apollo.

and although it be *true* that moſt of theſe were *Autors of Natural diſcoveries*, yet it is *firſt* obſervable how *all Antiquity* had ſuch a *Reverence* for them that were eminent for *Moral vertue*, *civil Prudence*, and thoſe *Qualifications* that inable a *Prince* to *Govern well*, that they made *Jupiter* to be the chief of all the *Gods*, and the moſt *powerful* of *them all*, whoſe *Fame* lay in the *Arts of Government*, in his Governing his Subjects in *Crete* with due admiration of *Juſtice*, in preſerving his *Land* and *Naval-Forces*, in advancing of *Commerce* and all *thoſe Sciences* that are uſeful in a *Society*. They made *Jove* the Father of *Pallas*, and *Mercury* the Deities of *Artiſans* and *Mechanical Philoſophers*. It is falſe that the *Gods they worſhipped with Temples and Altars*, *were thoſe that inſtructed the world to plow, to ſowe*, &c. For it is evident that all *theſe Honors* were conferred on ſuch as were not *Inventors*, ſo that he makes an *Antitheſis* where there is *none*. For the *deified Emperors*, the *Heroes* and *Semi-Dei* ſhared all theſe *Honors* with the greateſt *Gods*, and ſome of them in as *eminent* a manner as moſt of the others ; which any man knows that underſtands what veneration *Hercules* was in, and what *Tenths* were vowed to *him*, and what *Prieſts* he had. Every Writer almoſt tells us of *Temples* or *Fanes*, called Ἡρῶα erected for the Honor and the Worſhip of the *Heroes* ; alſo of their σηκοὶ, & ἱερὰ, of their *Sacrifices* and Feſtivals, ὡς ἥρωσι ἐνίσημοι καὶ τιμὰς δοσάσαιν ἀγῶνας καὶ ἱπποις θυσίας. He was not deified for his *Natural Philoſophy*, of whom *Virgil* ſaith,

If you read the Dedications of Altars to *Auguſtus*, and other *Heroes*, you will ſee the *Laws* of them were the ſame with thoſe of *Diana* in mount *Aventine*. See *Roſinus* Antiquit. l. 2.

Thucid. l. 5. vid. *Hen. Steph.* in vocibus σηκὸς, Ἄλσος, ἱερὸν, ἐνάλσια, ἡρῶον.

Nempe

Eclog. 1. *Nempe erit ille mihi ſemper* Deus ; *illius aram*
Sæpe tener noſtris ab ovilibus imbuet Agnus.

It was the ſame perſon to whom *Horace* relates :

Viventi tibi maturos largimur honores,
Jurandaſque tuum per nomen ponimus aras.

It was not for *ſuch curioſities* that *Julius Cæſar* had his place amongſt the *Gods*, and how he was worſhipped learn from *Maro* thus :

Eclog. 5. *Ipſa ſonant arbuſta*, Deus, Deus, ille, *Menalca.*
Sis bonus ô fœlixque tuis. En quatuor aras,
Ecce duas *tibi*, Daphni, *duoque altaria* Phœbo :
Pocula bina novo ſpumantia lacte quotannis,
Crateraſque duos ſtatuam tibi pinguis olivi.

Hæc tibi *ſemper erunt, & cum ſolennia vota*
Reddemus Nymphis, & cum luſtrabimus agros.

ut Baccho, Cererique, *tibi ſic vota quotannis*
Agricolæ facient ? damnabis tu quoque votis.

It is manifeſt then to any man of *common reading*, that the *Gods*, the Antients *worſhipped with Temples and Altars*, were not only thoſe that did *teach them to plant*, &c. And it is obſervable, that ſuch as were deified *upon any ſuch account* gained *ſuch Honors* in the moſt ignorant times and Nations : the more *prudent generations*, which deified the *vertuous*, the *wiſe*, the *valiant*, conferred no *ſuch reſpects* upon every *trivial Inventor of Mechaniſms*. Even *Rome* did ſo contrive the *Temples* of *Vertue* and *Honor*, that there was no *ingreſs* for a *Virtuoſo* there : no coming at the Temple of *Honor* but through that of *Virtue*. And *Tully* when he recites thoſe merits which advanced men to Heaven, he names them thus. *Aſt olla, præter quæ datur adſcenſus in cœlum mentem, virtutem, pietatem, fidem, earumque laudum delubra ſunto.* Even when the *deifying* humor poſſeſſed *ignorant* Mortals, I can frame no other judgment of things, than that there was much of *chance* in their advancement : for oftentimes the *greateſt Inventions* did not gain one thoſe *Honors*

Roſin. Antiq. Rom. l. 2. c. 19. Cicero de leg. l. 2.

which

which were payed to *inferior discoveries*. I do not finde that *Tiphys* who first built a Ship, or *Triptolemus*, who was *unci monstrator* or *atri*, had the honors of *Demy Gods*: nor that *Perdix* who invented a *Saw* was *deified*, but when his Master cast him head-long from *Minervas* Tower in *Athens*, they feined that he was turned into a *Patridge*, not a *God*: so that for ought I can perceive by this *Story*, had any man found out an *Ambling Saddle*, he might have been thought converted into an *Owl*, in stead of being worshipped with *Temples* and *Altars*. Neither was *Dædalus* so deified for his ingenious way of *pimping* for *Pasiphae*; not *Perillus* for the *Mechanical contrivance* of the of the *Bull* of *Phalaris* the *Tyrant*. In fine, from the days that *Sparta* flourished to the Empire of the *Mancha* under the ingenious Author of the *Experimental* History of *Don Quixote*, I do not find that the *little inventors* of *triviai* and *useless toys*, though *improvements of reall knowledge*, and of the *powers of all mankind*, have had that honor which Mr. *Sprat* intimates. I shall recommend unto my *Reader* the description of a most accomplished *Virtuoso* in *Maximus Tyrius*, his name was *Mithecus*, one not famous for *ancient Learning*, no *Orator*, *Sophister*, or *notional Philosopher*, but a man that was for the improvement *of useful knowledge in Cookery*, viz. *Hujus Sophistæ studium eo tendebat ut conficeret opus quod, quod voluptatem haberet una cum utilitate ipsa temperatum. Quippe qui concinnandis dapibus ita operam daret, ut escas acceptas ratione condimentorum temperamento, varietate, atque ignis ministerio vescentibus jucunditatem præbentes meliores multo quam pro natura propria efficeret.* None can deny this person the repute of an eminent *Virtuoso*, an *improver of the powers of man*, and a *discoverer of vulgar Errors*, (I know a Member of the *Royal Society* who hath *nothing in him* but the skill to dress a *Carp* well) this man was admired by all *Greece* almost, but not *deified*: he met with no *Temples*, nor *Altars*, but coming to *Sparta*, he offered to reclaim them from their *Black Broth*, and wretched *Cookery*, and to instruct them in

These discoveries are greater than what our Royal Society have produced: so that they might have misled of *Temples* and *Altars* notwithstanding that *they* contrived the *royal Catherines's* first Model, and built the *double keel'd* Experiment; which how she carried her self upon a *tacque*, how she would *beat up against the wind*, how she would live in a great Sea, their Historian tells not, but puts us off with a *fob*.

Sermon 8.

Maximus Tyrius Serm. 8. citante Jacob. Mazonio de comp. Arist. & Platon. Sect. 1. pag. 256.

those

thoſe diſhes which might be called (in the phraſe of our *Hiſtorian*) the *uſeful Arts of life*. But the Magiſtrates of *Lacedæmon* did ſummon *Mithecus* before them, *and baniſhed him immediately out of their Territories*. I find in *Michael Cerrantes* in the *Preface* to the ſecond part of the *Manchegal Experiments*, a narration concerning an *ingenious* perſon in *Spain*, who was eſteemed as *mad* by his Neighbours, though he did thoſe feats that that might have rendred him conſiderable to ſome of the *Society*, and gained him an *immortal fame* in *Philoſophical* tranſactions. The paſſage runs thus: "There was a Mad-man in *Sevil* "which hit upon one of the prettieſt abſurd tricks that ever "Mad-man in the world lighted on; which was: he made "him a Cane ſharp at one end, and then catching a Dog in "the Street or elſewhere, he held faſt one of the Dogs legs "under his Foot, and the other he held up with his hand. "Then fitting his Cane as well as he could behind, he fell a "blowing till he made the Dog as round as a Ball: and then, "holding him ſtill in the ſame manner, he gave him two claps "with his hand on his Belly, and ſo let him go, ſaying to thoſe "that ſtood by (which always were many) how think you "my Maſters? Is it a ſmall matter to blow up a Dog like a Bladder? However in this the moſt *Dull Members* of the *Society* are *redevable* to their *Hiſtorian*. He hath ſhewed that the *Ancient Paynims* did worſhip ſuch *Blocks* as ſome are *now*; and that *thoſe* heretofore would have paſſed for *Heathen Gods*, whom all ſober and Serious *Proteſtants* look upon as Heathens. Their *Founders of* Philoſophical *Opinions*, he ſays were *only admired by their own Sects*. But although Mr. *Sprat* ſay it, I am aſſured that *Plato*, *Pythagoras* and *Anacharſis* were admired by more than ever *ſaw* them, or were their *particular Scholars*, and *followers*. That *Ariſtotle* might admire his *Maſter*, and *Pythagoras*, and *Democritus*, and *Socrates*; that a *Stoique* might pay very great reſpect to *Epicurus*, is as credible, as that *Tully* ſhould eſteem the Friendſhip of *Atticus*; or *Brutus* revere *Caſſius*; or *Seneca* expatiate in commendation of the Tutor of *Metrodorus*: or that the *Seven Wiſe men* ſhould ſo admire the wiſdom of *one another*, as to tranſmit the Golden *Tripos* from themſelves and

Mr. Spra. p. 119

Preface to the ſecond part of the Hiſtory of Don Quixote.

and followers, each to the other. But that those *Antients* he so much talks of, did confer *those Diviner sort of Honors* upon the *Founders of Philosophical Opinions* and built some of them *Temples* and *Altars*, Mr. *Sprat* might have learned from *Tertullian*, who says, *Plerosque Autores etiam Deos existimavit Antiquitas, nedum Divos, ut Mercurium Ægyptium cui præcipue* Plato *adsuevit* : *ut* Silenum Phrygium *cui a pastoribus perducto ingentes aures suas* Midas *tradidit, ut* Hermotimum, *cui* Clazomenii *mortuo Templum contulerunt* ; *ut* Orpheum, *ut* Musæum, *ut* Pherecyden Pythagoræ *Magistrum*. But it is too much to expect that our *Virtuoso* and *Divine* should have read *Tertullian*. These are not times wherein men have will or leisure to look into those *Antiquated Studies* ; to be *Wits and agreeable company*, to be *Poets*, to see, and *understand* and *write Plays* ; to talk of and pretend to certain *Toyish Experiments* ; these are *Cares* of such *high concernment*, that all *Philology* is but *Pedantry*; and *Polemical Divinity*, Controversies with which we are *Satiated*. Howsoever one would have thought the ordinary stock of School-learning might have instructed Mr. *Sprat* in the *Mythology* of the *Ancients*, better than to have ignored *these things*. He might there have learned that the *Thracians*, and particularly the *Getes* (the most *Just*, and most *Valiant* Nation amongst them) did deifie and *offer Sacrifice*, and pay all those *Honors*, which were held to be most *Divine* unto *Zamolxis*, who, whether the *Servant*, or *Predecessor* of *Pythagoras*, it matters not, since *Herodotus*, *Strabo*, *Laertius*, and the Author of the *Etymologicon*, all agree that he was reputed and worshipped for a God : παρὰ τοῖς Γέταις Θεός. So saith *Strabo* of him : ὃν καὶ Γέται θεὸν, saith *Laertius*; He was the Founder of *Philosophical Opinions*, if *Pythagoras* was a *follower of his* ; and if *Pythagoras* taught *him* ; he was the *Promulgator* of Philosophical Opinions in *Thrace*, and having taught them the Immortality, and Transmigration of Souls, *and instructed them in their ways of worshiping God*, without any mention of his *Experimental Philosophy*, it is averred that he gained the esteem and worship of a *God*. That *Hercules* was a *Philosopher* and disciple of *Atlas* who instructed him in the Doctrine of the *Spheres*, and *Astronomy*, is as confi-

De Anima. c. 8.

Vid. Diogen. Laert. lib. 8. cum Notis Casauboni, Aldobrandini, & Menagii.

dently avowed, as it is *He* was *Deified*. So *Schrevelius*. *Constat enim* Herculem *Philosophum fuisse. Et ratio est, cur omnia illa monstra vicisse dicatur.* It is manifest that *Hercules* was a *Philosopher*; and for that reason he is said to have overcome so many Monsters (which were but *Monstrous Opinions*) and it is as notorious that for the subduing of *those Monsters*, he was reckoned a *God*, honoured with *Tithes*, *Temples*, *Priests*, and *Sacrifices*; That *Plato* derived all his repute from the *Inventive* and *Experimental Philosophy*, is a thing I yet understand not, but that there wanted not such as reckon him amongst the *Demy-Gods*, in a time when men had given over the *Deifying* of *Rat-catchers*, is certain. *Hunc* Platonem Labeo *inter Semi-deos Commemorandum putavit: Semi-deos autem Heroibus anteponit, & utrosque inter Numina collocat. Veruntamen istum quem Semideum appellat, non Heroibus tantum, sed etiam Diis ipsis præferendum esse, non dubito*, so saith *August. de civit. Dei. l. 2. c. 14.* And *that man of Stagyra*, that Idol of Disputers is termed an *Heroe* by *Jul. Scaliger*, a man of as *inquisitive* and *Experimental* a Spirit, as any of this *age* or *Mechanical Society* ever produced. Read his Character, and despair of the *like* that it will ever be given to any of the *Virtuosi*, viz. *de subtil. exercit. 194. Sect. 4. Barbara ingenia levissimis momentis impelluntur ad Divini atque incomparabilis Herois Obtrectationem. Duæ namque sunt Aquilæ solæ, in natura rerum: altera bellicæ laudis, altera literariæ; Illa potentiæ, hæc Sapientiæ*: Cæsar & Aristoteles. I am ashamed to be put upon the Proof of *those things*, which their Country School-Masters should have taught *them*, and so should have prevented me this *trouble*, which I find not yet to be at an end.

Vid. Shrevelium in Virgil. Æneid. l. 1. vers. 745.

"Their *Valiant men* and *Generals*, did seldome rise higher "than to *Demy-Gods* and *Heroes*. But the *Gods* they *Worshipped* "with *Temples* and *Altars*, were those who instructed the "world to Plowe, *&c.* —— By this *Antithesis* any one will conjecture that the *Heroes* and *Demi-gods* had no *Temples* and *Altars*, which is a childish and unpardonable *Error*, as any Boy conversant in the *Roman Antiquities* will tell him, and I have shewed before: Evander *propter summam Sapientiam &*

Erudi-

Eruditionem, pro Deo cultus est ab Aboriginibus : *imo* Romani *Divinos ei honores tribuentes aram Condiderunt, & quotannis Sacrificia obtulerunt, sicut & aliis Heroibus iidem fecerunt, ut testatur* Dionysius Halicarnassæus, lib. Primo. *Ara Evandri erat in colle* Aventino. No man ever took *Hercules* or *Zamolxis*, or *Castor* and *Pollux* and *Quirinus*, or those Roman Emperors that were Deified, as *Julius Cæsar*, *Augustus* and others for more than *Demy-Gods* and *Heroes*, yet had they *Temples* and *Altars*, Priests *and Sacrifices*, as every School-boy knows. Let any man enquire into the Ethnick *Theology*, and see if the Authors *of Natural Discoveries* either exceed in *number* or *dignity* the *Heroes* and *Demi-Gods* who gained an ἀποθέωσις by their *worth*, by being *Legislators*, *Generals*, or *Kings* and *Emperors* : If they do not, (as 'tis certain *they* do not) what *truth* is there in what Mr. *Sprat* tells his Majesty, that *a diviner sort of honor was conferred on them, than on the founders of* Philosophical *Opinions*? And how far will they be to *seek*, that go to search Antiquity for proofs *that* an *higher degree of Reputation is due to* Discoverers, *than to the* Teachers *of* Speculative Doctrines, *nay even to* Conquerors *themselves*?

D. Hal. Antiquit. Rom. l. 2. c. 17. de diis Indigetibus.

"*Nor hath the true God himself omitted to shew his value of*
"Vulgar *Arts*; *In the whole History of the first Monarchs of the*
"*World from* Adam *to* Noah, *there is no mention of their* Wars,
"*or their* Victories. *All that is Recorded is this, they lived so ma-*
"*ny years*, *and taught their* Posterity *to keep* Sheep, *to till the*
"Ground, *to plant* Vineyards, *to dwell in* Tents, *to build* Cities, *to*
"*play on the* Harp *and* Organs, *& to work in* Brass & Iron, &c.
I have already demonstrated the Ignorance of Mr. *Sprat* in *Philology* and humane Learning. Here he discovers himself to be as little acquainted with the *Bible*; and seems to have as little of *Divinity*, as other *Scholar-ship* in him. It is more than the *Text* warrants him, to say, That God Almighty mentioned those *Discoveries* out of his *Value of those Vulgar Arts*. Who made him Privy to the *Secret Counsels of Heaven*? or who impowred him to add to the *Scripture*? Doth he not fear lest *God* should add *unto him the plagues that are* written in that Book? Revel. 22. 18. It was good advice which *Agur* giveth, *Add not to his words*, Prov. 30. 6.

lest

leſt he reprove thee, and thou beeſt found a Lyar. Any man elſe who had conſidered how *the thoughts of God are not as our thoughts*; or have imagined that God took notice of thoſe *Vulgar Arts*, out of a *Value he placed on them*, wheras he no where ſhews ſuch an eſteem for *them*, nor takes notice of more important diſcoveries, which happened within the compaſs of *Moſes*'s *writing*, and might have *merited* his regard, as *well* as theſe. He takes no notice who firſt diſcovered *Minerals*; whoſe Inventions were *Gold* and *Silver*, and *precious ſtones*; whoſe project it was to make *Linnen*, and *Silks*, and the like. If theſe *Vulgar Arts* deſerved his ſacred Remembrance, as they were *Arts*, it is certain then that all *Arts* deſerved his Remembrance, and he would have been *Juſt unto them*. I ſuppoſe him to have forgot his *Logick*, and therefore needs to have that old rule ſuggeſted to him, *A* quatenus *ad* De omni *valet conſequentia*. But let us leave this *Secret* unto him *to whom it appertains*.

Such is the pulveriſing of Gold, when *Moſes* burnt the Golden *Calf* to powder; A thing not to be performed in theſe days, without the help of Chymiſtry.

I deſire to know by what right he calls thoſe *Inventors* of the ſaid *Vulgar Arts*, by the Title of *Monarchs*? Surely they were not *ſuch*: for neither *paternal* right, nor *Primo-geniture* (if they create any *Sovereignty*, as I am confident they do not) could intervene *here* ſo as to juſtifie *him*: for *Adam* lived to ſee *Lamech*, which was the *ninth Generation*: where then could be their *Monarchy*? or, who were their *Subjects*? Can any man imagine that *Abel* was ever a *Monarch*? or that *Cain*, at the time when he *tilled the Ground* (as his Brother kept *Sheep*) was capable of ſuch a *Title*? or, that *Jabal*, *Jubal* and *Tubal-Cain* were Monarchs during the life of old *Lamech* their Father? this is not amongſt the *things Recorded of them*. —— "For there is *no more ſaid of them* (if we believe "Mr. *Sprats* great Reading) *than that they lived ſo many years, and taught their poſterity to keep ſheep*, &c. But is this all that is recorded of them? Dare you avow the ſaying in *verbo Sacerdotis*? Is the Hiſtory of the *Creation*, of *Paradiſe*, the *fall of man*, *the puniſhments of his ſin*, the *promiſe of a Meſſiah*, the *acceptableneſs of Piety*, *the odiouſneſs of impiety*, *ſpecified in the accounts of* Cain *and* Abel, together *with the examples of* God's *Vengeance purſuing ſinners in this life*, *and the terrors of a guilty Conſcience*;

Conſcience; Is the Hiſtory of *Enoch's walking with* God, *and his Tranſlation*; *the Relation of the wickedneſs of the World, and of the Deluge enſuing thereupon*; the *ſevere prohibition of Murder*; the *preſervation of* Noah; the *Sacrifice he offered at his coming forth*; God's *promiſe thereupon*; His *Covenant with* Noah: Are all theſe *inſignificant* paſſages *not worth the regard*, not ſo *conſiderable* as that *Noah* (ſubſequent to all theſe) planted a *Vineyard*? whereas he ſaith, there is *no mention of their Wars or their Victories*; How can he reconcile this with the Battle of thoſe two mighty *Monarchs Cain* and *Abel*, in the which the *one* was ſlain, the other remained *Victorious*? Did not that *puiſſant* Prince *Lamech* kill a man to his wounding? But, above all, who could have imagined that a *Virtuoſo* of *this age* ſhould not have taken *ſpecial* notice of that part of the *all* which is recorded of thoſe *Monarchs*, that relates to *Lamech* his having *two wives*? and that the reſt *begat Sons and Daughters moſt of* them? As to the Diſcoverers of thoſe uſeful Arts recorded in *Scripture*; it is uſually obſerved by *Divines* upon the *place*, that the *greateſt Inventors*, and the moſt ingenious at *Experimental Philoſophy*, were the brood of *Cain*; and to pretend with ſo much ado to be the imitators of that *wicked progeny*, puts me in mind of a ſort of Heretiques in *Epiphanius*, who derived their pedigree from *Cain*, and claimed Kin with *Core*, *Dathan*, and *Abiram*. Thus the *Teufels* a Family in *Almain*, are ſaid to give as the Arms of their Houſe, a *Divel Gules, in a Field Or*. The concluſion of that Chapter in which *God* is pleaſed to Record thoſe *authors of Natural* Diſcoveries, is very remarkable, intimating as if the riſe of *Experimental Philoſophy*, were the *Ruine* of *Piety*, and that whiles men were ſo buſie about *Earthly concerns* they had forgot to *Worſhip God*. *Then began men to call upon the Name of the Lord*. Which words admit of various Expoſitions, but ſuch as *all* carry a reflexion upon the *Inventors*. Some read it to this purpoſe; *Then profaneneſs began in calling on the Name of Jehovah*. With which accords the *Chaldee* Paraphraſe, *Then the Sons of man left off praying* (or, became profane, ſo that they prayed not) in the Name of the *Lord*. Others Expound it thus; that when

Gen. c. 4 v. 26.

See *Aynſworth* upon the place.

when the Holy Seed *Enoch*, *Mathuſelah*, *Noah*, *&c.* ſaw impiety to encreaſe, and that *men* laid aſide all *fear* and worſhip of *God*, to proſecute *Inventions delightful* and *profitable*, they began to be troubled, and to *call upon God* in *a peculiar manner*, and to preach *Repentance*. A third party thus ſenſeth it, that when the Sons of *Cain* buſied themſelves in the *diſcoveries of Nature*, and the *divertiſements of Luxury*, and were called perhaps, the *ingenious*, and the *Curieuſe*, the *Saints* and Holy race did not ſeek to be denominated from their *Carvings* or their *Muſique*; but the *fear of the Lord*, which is the *beginning of* all ſolid *Wiſdom*: and by their *calling upon the Name of Jehovah* were contra-diſtinguiſhed from thoſe *Experimentators*. Had I been as Mr. *Sprat*, I would have declined this part of the *Rhetorical Addreſs*, by reaſon of this *ſevere reflexion*, which he muſt needs ſee was obvious to every Adverſary.

"And if they deſerved a *Sacred Remembrance* for one *Na-*
"*tural* or *Mechanical Invention*, your *Majeſty* will certainly
"obtain *Immortal Fame* for having Eſtabliſhed a perpetual Suc-
"ceſſion of *Inventors*. —— In the firſt place Mr. *Sprat*, I am to ſeek, How theſe perſons could by their Inventions *deſerve* at the hands of *God*? What *Doctrine of Merit* is this you would introduce? Is not the *Plowing* of the *wicked*, Sin? Are not the *beſt of men* to ask pardon for the defaults that attend their beſt *actions*? Is it not true, *Deus coronat in nobis ſua opera*? What have we *that we have not received*? Where then is any *deſert* or *boaſting*? In the *Antapodoſis* of this Period, I expected an inference, that *God Almighty* would have ſent ſome new *Prophet* or Holy Penman to Record the *Natural* and *Mechanical Inventions of this Age*, to perpetuate their *Glory*, and the *Eſtabliſhing of the Succeſſion of Inventors*: But he promiſeth no ſuch thing: only he aſſures the King of *Immortal Fame* for Eſtabliſhing this *Society of Inventors*: whether they invent any thing *material* or *no*.

When I conſider the *Falſhood* of their *Natural Relations*, the many *untruths* which *He* and Mr. *Glanvil* and other *Virtuoſi* obtrude upon us, as to the *Antient Writers* and *their Ignorance*; and as to *Modern Writers* and their *Diſcoveries*; I fear the

teſtancy was introduced and *Communion* with *Papiſts* refuſed. The *Papiſts* themſelves did avow it: they held that the *Church Catholick* could not Erre, and that *they*, that is the *Chriſtians* in *Communion with them* were the *Church Catholick*. If the *Popes* Infallibility came to be aſſerted, it was by the Canoniſts (impious and indeed Blaſphemous Paraſites) *Sic omnes Apoſtolicæ ſedis Sanctiones accipiendæ ſunt, tanquam ipſius Divini Petri voce firmatæ ſint.* So ſaies *Gratian. Diſtinct:* 19. *Canon*: 2. But the General Counſels of *Piſa*, *Conſtance* and *Baſil* have ſufficiently damn'd this Doctrine. *Leo* the Tenth in the *Lateran* Counſel ſaid indeed, that none of his Predeceſſors *had erred* (but he evidently erred in ſaying ſo) yet he neither did nor durſt ſay *they were infallible*. The Jeſuites of late do (I confeſs) aſſert the Popes infallibility, but I well know the *Sorbon* and the (a) *Parliament* of *Paris*, and the (b) *French King* too have lately damn'd this Doctrine (of the *Popes* ſworn Janizaries.) Nay ſo ridiculous is this aſſertion of theirs, that they neither tell us, nor know themſelves, how he is infallible: whether by himſelf, or with his Conſiſtory of Cardinals or a General Counſel? and then, what is a true General Counſel? who muſt call it? who have deciſive Votes? and whether all or the Major part may be enough to make a Canon? Concerning theſe (and many ſuch Queſtions more) they are not agreed, and ſo cannot aſſure us of what they are not aſſured themſelves. If any *Pope* ever did aſſume a *perſonal infallibility and Soveraignty in matters of Faith*, any man might have rejected the bold *Aſſertor* without being an *Heretick*, or being guilty of *Apoſtaſy* from the *Roman-Catholick Church*, for the *Gallican Church* keep Communion, and yet ever denyed the *Popes* infallibility. In fine, the Point of *Infallibility* of the *Roman-Catholick Church* (I am not ſuch a Fool as to ſay the Infallibility of the Biſhops of *Rome*, for they are confeſſed to have *Erred* and that *damnably* ſome times) was not the *occaſion* of the rupture betwixt the *Papiſts* and the *Proteſtants* at firſt; nor doth it now continue it otherwiſe then by *accident*, in as much as it hinders the *Reformation* of thoſe

(a) *Arreſt de la Cour de Parliament portant que les propoſitions Contenuës en la Declaration de la Faculte de* Theologie *de Paris. &c. Da.* 30. *May.* 1663.

(b) *Declaration du Roy pour l'Enregiſtrement des ſix propoſitions de la Faculté de* Sorbonne, *&c. A Paris.* 4. d'Aouſt 1663.

Idolatrous

Idolatrous Tenets and practiſes with which that *man of Sin* hath filled *his adherents*, and without the profeſſion whereof no *Proteſtant* can be admitted to their *Church-memberſhip* and *Communion*. Let any man but comply with them in theſe *Solemnities*, and I dare engage that he ſhall never be preſſed *Authoritatively* to own that *perſonal Infallibility* of the *Pope* or his *Soveraign Dominion in matters of Faith*: So that there muſt be more *Important grounds* than Mr. *Sprat* imtimates for that great Action of the *Reformed Churches*; or the imputation of *Malepertneſs* and horrid *Schiſme* muſt be fixed on them: But the Truth is, *they* were *infallibly* certain *Certitudine fidei*, as aſſured as they were of the Truth of the *Bible*, and *Gods word*; and as *Morally* certain as *Metaphyſicks*, natural (That is *Ariſtotelian*) Phyloſophy, and *Skill of Tongues* could make them, that the *Papiſts* did hold ſuch *Errors*, as none could *know*, and *Communicate* with, without hazard of damnation; Nor any *Ignorantly* profeſs and be *ſaved*, without the benefit of an hearty though *General* repentance, and the *boundleſs* (but not to be preſumed upon) *Effects* of that mercy of *God* in *Chriſt*, which the *Antichriſtaniſme* of that *Satanicall Synagogue* otherwiſe would fruſtrate. Tis not diſputed betwixt *Church* and *Church* whether the *Pope* can *add* new Articles of *Faith*, or vary the *old Creed*: the current of *Popiſh* writers aſcribe unto him no ſuch *Dominion over our Faith*, no nor to their Counſels. They are to enquire *Quid traditum eſt?* What there is of Eccleſiaſticall *Tradition* in the Scripture and the *Church Doctrine and Practiſe*, and to determine *this* or *that* to be *de fide*, becauſe it hath alwaies been *de fide*: Every *Point* that comes ſhort of this *declaration*, is ſo farr ſhort of its *Catholiciſme*, and the *Obligation to believe it*. And now let any man Judge whether Mr. *Sprat* were of the number of thoſe that were *Satiated* (to uſe his own expreſſion pag. 152) *with Religious diſputes*, or of thoſe that never looked into them; how neceſſary ſoever they be to the ſupport of the *Engliſh Monarchy*, the *Church*, of which he is a *Member*, & the *Salvation of his Soul*, which is of more importance, then theſe *Natural Experiments*. I could have

Nec modus ullus eſſe debet inveſti gandi *veri*: *Et quærendi* turpis *defatigatio, cum id ipſum quod quæritur ſit pulcherrimum.*

with

with more confidence cryed out, *How beautiful* are his *Feet* and *Hands*, had I found him employed in the *Goſpel-work*, than in this *Society*. But he gives me no cauſe for this Exclamation: that which follows is of ſo pernitious conſequence. —— "Some of the *Reformed Churches* thought "themſelves obliged to forbear all communion with them, "and would not give them that reſpect which poſſibly "might belong to ſo *Antient* & ſo *Famous a Church*. —— I am much to ſeek which of thoſe that wear the name of *Reformed Churches* did ever hold it lawfull to *hold Communion* with the *Biſhops of Rome*, and their adherents. For ſince the Queſtion is not concerning *Civil Commerce* and Actions of *General humanity*, but concerning *Church-Worſhip*, and joyning with them in the *Sacrifice*, *Prayers*, and *Ceremonies* of their *moſt ſuperſtitious Maſs* (to be preſent at and bear a part in the Service, and to receive the Sacrament are with them, as with the *Church* of *England*, tokens of the Church-Communion, and not the hearing of *Sermons*) and at other times *owning them as a Church of Chriſt*: Since this is the Queſtion, I would willingly learn of our *Hiſtorian*, which of the *Reformed Churches* hath not forborn all *Communion with them* and taught it to be *neceſſary to do ſo?* It is true the Church of *England* hath upon very eaſy termes made way for the *Papiſt* to come to *us*, to *communicate with us*: The *Hierarchy*, the *Ceremonies* retained, the very *Liturgy* word for word being *ſo framed*, that whatever they hear or ſee at our *Service* is not repugnant to what *their Church* followeth; as Mr. *Hales* in one of his Sermons doth ſhew: And indeed they differ no more than a *Bible* with the *Apochrypha* from one which wants it. And this in great part is the foundation of our *Penal Lawes* againſt the *Papiſts*, becauſe they do refuſe to come to hear and aſſiſt in the *ſame Prayers* and ſervice which their Church uſeth, or *only* condemns becauſe it is not of the *Pontifical approbation*. If the *Papiſts*

Though Mr. *Sprat* teach us in this Hiſtory that 'tis *uncivil* to condemn the *Religion of other Countries*: Yet the Apoſtles were not bred up to that *civility*.

Mr. *Chillingworth* teacheth, that it is impoſſible for any to hold

External Communion with the Church of *Rome* and not to Communicate with her Errors: and declares he never met with any *Proteſtants* that held it lawfull; but he lived not to ſee our *Inventors* nor this *Hiſtory*.

ſhould *comply* in the manner *demanded* with the *Church of England*, it might then be ſaid indeed that they Communicated with us; But not that we *held Communion with them*, except we likewiſe *reſorted to Maſs*, joyned with them in their prayers, and participated there; which is a thing our Homilies, the Articles of our Church, nor (I think) any of our *Church-men* ever taught, nor could *it be done* without danger of ſtrengthening *them in their Superſtitious and Idolatrous waies*, and the hazarding of the whole intereſt of the *Kingdome of Chriſt* as it is lodged in the *Proteſtants*, they being apt thereby to be enſnared, and from a mixing *Fellowſhip* with *God* and *Belial* come at laſt to fall into *Popiſh Idolatry*.

1 Cor: cap. 10. ver. 20, 21.
1 Cor: cap. 6. ver. 15, 16.

Certainly neither the *Antiquity* nor the *Fame* (Arguments ſo powerful with Mr. *Sprat*, but ſo ridiculous, ſo extrinſecal to truth, and Baffled by all *Proteſtant Divines!* can warrant this procedure. This the *Papiſts* are aware of, who ſhew no ſuch regard to the Ancient and Famous Church of *England*. And it is evident that Errors are not the more *tolerable*, but the more *dangerous* for being *Ancient*. Could antiquity or Fame give Credit to impious Communion or Civilities, how ought we to *Reverence* that *old Serpent*, whoſe Antiquity, whoſe *renown*, whoſe *extent of Dominion* is ſuch, that all which Mr. *Sprat* ſo much admires, and *Pleads for*, is but a *part* of it. Mr. *Sprat*, Mr. *Sprat* let me tell you and ſome of your fellow-*Virtuoſi*, that there is a tenderneſs *for thoſe without* which is *Cruelty* to *thoſe within*: and that you muſt have a care how you *deſtroy thoſe who profeſs the Goſpel and for whom Chriſt dyed*, to gratify ſuch as live in oppoſition to him in all the *Offices* of his *Mediatorſhip*, & to whom he will ſay at the laſt day, *I know you not, be gone you workers of iniquity*. But I ſhew too much of the *Divine*, whilſt our *Hiſtorian* ſhews ſo little: but I could not diſpenſe with this *Paſſage*: and I wonder how it ever could be permitted in ſuch a piece: *leſt it* ſhould be thought to be the Judgement of that *Illuſtrious Society*, and that they were making way for the Introducing of ſomething elſe beſides

beſides a *New Philoſophy*. It is a Caution which the *Apoſtle* Suggeſts unto me, *Take heed leaſt by any means this liberty of yours become a Stumbling block to them that are weak. For if any man ſee thee which haſt knowledge, ſit at meat in the Idols Temple: ſhall not the Conſcience of him that is weak, be emboldned to eat thoſe things which are offered to Idols? And through thy knowledge ſhall thy weak brother Periſh, for whom Chriſt dyed? But when ye ſin ſo againſt the bretheren and wound their weak Conſcience, ye ſin againſt Chriſt, 1 Cor: cap. 8. ver. 9, 10, 11, 12.*

"I can only apply my ſelf to that *good Nature*, which "a Great Man has obſerv'd to be ſo peculiar to our *Na-* "*tion*, that there is ſcarce an Expreſſion to ſignify it in "*any other Language*. —— This Notion about *Good Na-ture* hath ſo delighted Mr. *Sprat* that in his Diſcourſe againſt Mr. *Sorbier*, he thought fit to propoſe it to the world, and here to repeat it again. In that Diſcourſe he makes *this Obſervation* to be an Inſtance of the pro-found *Criticiſme* of the Earl of *Clarendon* But cer-tainly never was a great Miniſter of *State* ſo abuſed by an ill defence as that Honorable perſon was, when ſuch poor things were alledged in his Commendation, he ſee-med more depreciated by his *Apologiſt*, than by his *Adver-ſary*. I am apt to believe that the *Great-man* (yet whoſe *Great-neſs*, did ſcarce ſurpaſſe that of Sir. *Tho. Moore*, or the Lord *Bacon*, to whom Mr. *Sprat* compares him) had other Ex-cellencies then a *Criticall* knowledge of *Ancient or Modern* "*Languages*. But Mr. *Sprat* ſaies this of him —— There "is Scarce any Language in the world, which can pro-"perly ſignify one Engliſh expreſſion, and that is *Good-*"*Nature*. Though Monſieur *Sorbier* will not allow the "*Noble Author of this Note* to have any Skill in *Grammer* "*learning*, yet *He* muſt pardon me, if I ſtill believe the *ob-ſervation* to be *true*. —— I know not how kind Monſieur *Sorbier* may be unto *him*, and how he may practice a quali-ty which is ſo *hard to be Expreſſed*: But I am ſure, I cannot indulge him in this Conceit: for if the *French* do not ſignify the ſame by *un homme de bonne Nature* et *homme d'un bon*

Hiſt: of the R. S. Pag. 61.

naturel: I am ſure that one ſhall find that the *Greeks* do equal the Emphaſis of our *Engliſh* in that of Ἐυφυὴς, and tranſcend it in the word Καλοκάγαθ&. What other Languages may do, it is for Mr. *Sprat*, and others to *determine*, without underſtanding them; I care not to render at preſent ſuch teſtimony of my *folly*.

If any be not ſo good a Grecian as to be convinced of the Signification of Ἐυφυὴς let him but read what *Hen. Stephanus* in his *Theſaurus Ling. Græc.* ſaith of it and he will no longer doubt.

Miſtakes

" more drnk (neither hot, nor cold) then would mode-
" ratly quench and aſſwage his thirſty appetite: Thus
" with luke-warm drink, temperate heat, and meaſurable
" clothes *many Eſcaped*, Few which uſed thi s order (after
" it was found out) dyed of the Sweat: marry, one point
" diligently above all other in this Cure is to be obſerved,
" that *he never did put his hands or Feet out of the bed to refreſh*
" *or cool himſelf*, which to do is no leſs jeopardy than
" death.

Polydor. Virgil. *Hiſt. l. 26. Henrici* Septimi.

Eodem anno novum morbi genus pervaſit totum regnum, ſub primum Henrici *in inſulam deſcenſum, dira quidem lues, & quam nulla ſit ætas antea, quod conſtet, perpeſſa: ſubitò enim* ſu-
" dor mortifer *corpus tentabat, ac ſimul dolor caput Stomachum-*
" *que vehementi caloris ardore affectum angebat. Quo in mor-*
" *bo homines qui a principio erant, quia alii æſtus minus patien-*
" *tes, ſi in lecto erant, Stragula dimovebant, ſi veſtiti, veſtes de-*
" *ponebant; alii ſitientes frigidum potum ſumebant, alii demum*
" *patientes caloris fœtorisq; nam ſudor grave olebat, additis ſtra-*
" *gulis, ſudorem provocabant,* æquè omnes *aut illicò, aut non multo*
" *poſtquam ſudare cœpiſſent, moriebantur, ita, ut ex omni ægro-*
" *tantium numero, vix centeſimus quiſque evaderet. Neque*
" *ulla interim medicorum ars aut ſcientia quicquam opitulabatur,*
" *quin morbi novitas omnem illorum excluderet peritiam. Verùm*
" *poſt viginti quatuor horas (tanto temporis Spacio vis ejus*
" *morbi durabat) abeunte ſudore, nonnulli confirmabantur: non*
" *eo tamen ita expurgati erant, quin iterùm atq; iterùm in*
" *morbum reciderent, multiq; inde perirent. Sed ea res reme-*
" *dium tanto malo ad ultimum monſtravit: nam qui ſemel primo*
" *ſudârant, cum deinde rurſum ægrotarent, obſervabant ea quæ*
" *in primâ curatione, profuiſſent,* et illis pro remedio utentes,
" *addebant ſemper aliquid ad curationem utile. Item et illi iidem*
" *cum iterùm in idem valetudinis genus inciderent, ex priore*
" *obſervatione earum rerum, per quas ſe confirmâſſent, ita ſe cu-*
" *rare didicerunt, ut vim ſudoris illius facilè tolerarent. Quibus*
" *rebus ita uſu venit, ut poſt ingentem mortalium ſtragem reme-*

 dium

"dium vnicuiq; promptiſſimum inventum ſit, quod hujuſmodi eſt,
"Siquis interdiu ſudore corripiatur, cum veſtitu protinus cubatum
"eat: ſin noctu, et in lecto, tum quieſcat, nec ſe è loco moveat, uſque
"ad viginti quatuor horas exactas: interim ita ſe ſtragulis oneret,
"quò non provocetur Sudor, ſed ſua ſponte molliter ſtillet, cibi ni-
"hil capiat, ſi tam diu famem tolerare poſſit, neque plus potionis
"conſuetæ ac calefactæ hauriat, quam modicè ſatis ſit ad ſitim ex-
"tinguendam; inter hanc curationem inprimis caveat, ne manum
"quidem aut pedem ſui refrigerandi, recreandique cauſâ, extra
"ſtragula proferat, quod facere letale eſt. Hoc remedium eſt
"novo morbo inventum, qui tantum Angliam id temporis per-
"vaſit et poſthac ſæpè graviter afflixit.

Thoſe of the *R. S.* that underſtand no more than Engliſh may compare the account of *Hollinſhed* (or *Hall* in his Chronicles) with that of the Lord *Bacon*; the more learned may conſult *Polydore Virgil*, and if they pleaſe *Fracaſtorius de contag. l.2.c.5. Pareus de peſt.l. 25. c.5. Hollerius de morbis intern.l.2.c.de ſudore. Langius Ep .l. 1.Ep.19. Beverovicius de. med. veter. part. 3. c. 3. pag: 222. Tho. Cogans haven* of health. *pag*: 272. & *Senertus de Febrib.l.4.c.15*. All of them will be preſently ſatisfied how little the Phyſicians are beholden to the Lord *Bacon*, as if he alone had recorded that *Cure*, which ſo *many* beſides have committed to writing. Nay it will appear that the account he delivers of that *Cure* is very imperfect, and ſuch as none but ſome ſuch inconſiderate *Virtuoſo*, would have *acquieſced* in, much leſs have recommended. For whereas the *others* direct *that the ſick party if dreſſed in his cloaths*, ſhould immediatly lye downe, without ſo much as adventuring to put of his cloaths: This Circumſtance, of how great *importance* ſoever is totally omitted: and I think that great *caution of putting the Hand* or *Foot*, or any part of the body out of bed, *or into any cool place* (which they all ſo ſeverely inculcate) is not ſufficiently intimated in that expreſſion, of keeping themſelves in an equal temper, both for clothes and fire. And whereas they ſay *the Patient*, muſt refrain from all meats, if poſſible, for 24 hours, which leaves the party at liberty, to comply with the vital indication, in caſe.

They were not to ſleep during the *twenty four hours*, as *Tho. Cogan* obſerves in the place aforecited: and ſo doth *Caius*.

case of extremity, otherwise not; of this our renowned Lord makes no mention, nor that the same person might have it twice, or thrice; which is a material observation; nor mentions he the stench of the Sweat, and other Symptomes.

Some having had it twice, died the *third* time of it, as *Cogan* relates.

But concerning the *Nature* and times of the *encrease*, *State* and *decrease* of the *disease*: and the manner of feeding, and giving drink to the sick (they gave them *Beer*, *Ale*, *Wine*, as well as other *Juleps*) according to several exigencies and occasions (upon the observation whereof depended their *recovery*) it would be too long to transcribe the passages in *Caius*; and yet without the knowledge thereof this *almost Infallible medicine* would signifie nothing, or as little as we see *good medicaments* now do, when they fall into the Hands of a *little dabler in Physick*, who boasts himself a *Virtuoso*, or an admirer of *them*. But in those daies when *Caius* himself attended, and more *particular directions* were published in English for the instruction of the people, yet an infinite number of *Rich* (most of *them*) and *poor* were swept away. *Quoquò te vertisses, cadaver conspexisses. Continuus undiq; nolarum ænearum pulsus, confusus sonus erat.* So *Caius*. Whose Book I do recommend to all inquisitive persons, as containing several *Curious* as well as *necessary* observations: nor will I doubt to say that if all that ever my Lord *Bacon* writ, were put into the Scales, (and the *History of the R. S.* and all their discoveries cast in) that single treatise of *Caius* for *Utility* would out-weigh them all, and *deserves* to be secured from Oblivion by *publick Authority*, least what afflicted this Nation so miserably at sundry times for *fifty* years space, should returne again, and produce as direfull effects as ever.

When I reflect upon this *remedy* as it is recommended to our admiration, and imitation by this *Historian*, methinks I begin to doubt that those *persons* will hardly be *punctual* in their own *Relations*, who have the confidence to obtrude upon us *such an imperfect one* from *another*. I question not but we are more secured by *Holinshed's* having set it down, than by its being inserted into the History of the Lord

Bacon, the works of the former will be ſo much more valued then the latter by our Nation, as long as they have any Judgment. The truth is the Lord *Bacon* is like great piles, when the Sun is not high, they caſt an extraordinary ſhadow over the Earth, which leſſeneth as the Sun grows verticall. In the account of the *Sweating-Sickneſs*, what underſtanding Phyſician can read without laughter the Character he gives of the diſeaſe. *It was a peſtilent Feaver, but* (as it ſeems) *not ſeated in the veins or humors, for that there followed, no Carbuncle, no purple or livid Spots, or the like, the maſſe of the body not being tainted: only a maligne vapour flew to the Heart, and ſeiſed the vital Spirits, which ſtirred nature to ſtrive to ſend it forth by an extream Sweat.* But *Polydor Virgil* and *Holinſhed* prudently decline the controverſy about the nature of a *Peſtilential Feaver*, and only tell us that *A deadly burning Sweat ſo aſſayled their bodies, and diſtemper'd their blood with a moſt ardent heat* (they being ſick in head and ſtomach) *that ſcarce one amongſt a hundred that ſickned did eſcape with life.* He that tells me the diſeaſe is a *Peſtilent Feaver*, and the Sweat is *an effect* of *nature* endeavouring to *expell* the Malignity: puts me upon ſome thoughts that I ſhould not have, if I took the Sweating to be the primary diſeaſe, or a Symptome conſequential to *its Malignity.* And whereas our Lord ſaith *Nature did ſtrive to ſend forth its virulency by an extream Sweat*: I find not any ſuch thing, for all that recovered were recovered by the continuance of a moderate Sweat: This experience and obſervation taught them; and the Phyſitians, imitating thoſe operations of nature, did adviſe them unto it. All *Extream Sweats* either Spontaneouſly happening, or procured by Art, were *Mortall.* As to the Seat of the *peſtilential venome*, it ſeemed not to that *Lord to be in the Maſſe of blood and humors, but only in the vital Spirits.* And *why?* becauſe *there followed no Carbuncle, no purple or livid Spots or the like.* Is it then neceſſary that whenſoever there is a *Peſtilential Feaver*, which affects the Maſſe of *blood*, that then there muſt be ſome cutaneous eruption, by *botch, Carbuncle* or *Spots?* No Phyſician will ſay it. *Nonnunquam evenit*

evenit, ut in febre manifestè Pestilenti, ac fortè cæteris maligniore, neque papulæ, neq; tumores, neq; ulla naturæ depulsio conspicia Massarius de febrib. c. 24. But that the Seat of this disease was *Principally* or solely to be placed *in the Masse of blood and humors* appears, first from the occasionall external cause of it, a moist season preceding, which multiplyed the like humors in the people; Next it is evident from the *Symptomes* that attended it, particularly the *horrid stench* of the *Sweat*, which issued from them that were sick of it: of which *Polydor Virgil* takes notice. *Sudor Britanicus est quidem Diarius, quia Spatio viginti quatuor horarum perficitur; ut tamen non ob id sub verâ febre diariâ, quæ ex Spiritibus calefactis et putridis Fiat, collocari potest. Nam referunt Britanni medici, et proximi Belgæ, quod non solum ægrotantes sudant, multoq; sudore perfundantur, verumetiam quod sudor iste est fætentissimus: ad hæc urinæ lividæ apparent, ac valde corruptæ, sanguisq; aliàs per vesicam excernitur plurimus, alias effluit per nares, quin et per aures, quandoq; etiam per oculos stillat, Ex quibus colligitur putrifactionem esse in ipsis humoribus, alioqui laborantibus solis spiritibus urina non mutaretur, nec sanguis adeo copiosè efflueret. Septalius de peste l.* 1. *c.* 21. I have have been thus particular about this disease, thereby to take of the repute a little of my Lord *Bacon*, as he fell in my way, whose steps our *Society* pretend to tread in; and that *so exactly* as even to *mistake* where *he* did. If any shall reply in behalf of that Lord, that *He was no Physitian*, and that in an History, we are not to expect an accurate relation of any disease and its Cure; I shall willingly allow of the *Answer*; but I must not allow Mr. *Sprat* that *excuse*, who (*not owning the prescription to be any where else*) remits us to the Lord *Bacon* for a Cure for the Sweating-Sickness, which is *almost Infallible*, and the preservation whereof in that book, secures the world from incurring the *like hazard again*: which it might have done, had the receipt fallen into the hands of some avaricious *Doctor of Physick*. Because here

Ephemera benigna est, Anglica febris maligna et pessima, et symptomata habet horrenda, sudorem perpetuum, lipothymiam, cordis palpitationem pulsus frequentiam, et inæqualitatem: adde quod tanta sudoris copia, tam longa convalescentia in his qui evadunt, humores infectos in ea febre indicant esse. *Rodericus a Fonseca* method. cur. febr.

here is ſuch adoe about a receipt, and that the *Society* promiſe us to record many more, (fully as good as this!) I ſhall inquire into the ſucceſs of this *almoſt Infallible Medicine* a little further. That the *Sweating Sickneſs* did rage again in the twenty ſecond year of the Reign of *Henry* the ſeventh, I have already ſhewed out of *Hollinſhed*, and of the *ſucceſs* that *Method* had in curing it, which was indeed ſuch as might give a *reputation* unto it, though not ſo great as our Hiſtorian fixeth on it. About nine years after. *An. D.* 1517. in the Reign of *Henry* the eighth, the *Sweating-Sickneſs* did much infect the Kingdome again: and ſince it cannot be imagined that in ſo ſhort a time the people ſhould have forgot a *Medicine*, which they are obſerved to have remembred *twice as long* before, let us ſee what effect this *almoſt Infallible Cure* produced.

It is obſerved by Dr. *Caius* who lived and writ during the laſt Sweating-Sickneſs, that it raged five times in this Nation. Firſt in the year 1485. from the beginning of *Auguſt* to the laſt of *October*. This is the time Mr. *Sprat* relates unto. A ſecond time in 1506. during the Summer. A third time in 1517. from *July* to the middle of *December*. A fourth time in 1528. during all the Summer. A fifth time in 1551. when it laſted above five moneths, beginning in *Shropſhire* about *May*.

Herbert in H. 8. *An. Dom.* 1517.

"Truely *the diſeaſe* (notwithſtanding this "Courſe!) *was of that malignity, as within the ſpace of three* "*hours it killed! This cauſed the King to leave* London, *and* "*adjourning three Termes*, 1517. *to remove* Trinity-*Terme*, "1518. *to* Oxford *where it yet continued but one day and was* "*adjourned again to* Weſtminſter. *Nevertheleſs divers* "*Knights, Gentlemen and Officers of the Kings Court died there-*"*of, as the Lord* Clinton, *the Lord* Grey *of* Wilton, *and others* "*of quality; the Vulgar ſort ſo commonly periſhing, as in ſome* "*towns it took away half the people, in others the third part.* "*The* ſame diſeaſe *again brake out under* Ed. 6. 1550. *It* "*raged extreamly through the land, wherein died the two* "*Sons of* Charles Brandon, *both of Dukes of* Suffolk, *be-*"*ſides an infinite number of men in their beſt ſtrength; it* "*followed only Engliſh men in Forreign Countries, no* "*other people being infected therewith, whereby they* "*were both feared and ſhunned in all places where they* "*came.*

Jo. Speed in Ed. 6. Sect. 65.

What *Speed* ſaith concerning the *Sweating-Sickneſs*, that it at that time purſued the Engliſh abroad, without infecting the Forraigners where they ſojourned; this is confirmed

firmed unto us by the learned and accurate Dr. *Caius*, who ſaith that it purſued (in the daies of *Ed. 6.*) the Engliſh every where, into *Scotland*, *Holland* and *France*. So that it was in vain for any of them to fly their Country. As to the Forraigners, even the *Scots* were not infected with it though living in England at that time: nor did the diſeaſe then ſpread abroad ſo as that the diſeaſed Engliſh ſhould infect the Nations they fled into, or converſed with. He obſerves alſo that in 1529. When the *German* ayre became infected with a *peculiar ſort* of *malignity* (which yet did not difference the diſeaſe in its Symptoms or Cure) the ſame Sickneſs did ſeiſe the *Dutch*, and not the *Engliſh*, *viz. Hi noſtro aere & contagione non læduntur, ſed ſuo: nos non ſuus illorum ſed noſter inficit.*

It were eaſy to proſecute this argument further, and to ſhew the vanity of this *almoſt Infallible remedy* (though amplified with all the circumſtances any *Phyſitian*, except Dr. *Caius*, ſets down) eſpecially when it falls into the hands of *Empiricks*, and men of little reading; But I think ſuch labour altogether needleſs to my preſent purpoſe; and it is a *Supererogation* of my kindneſs to the *Vertuoſi*, that I give them this enſuing caution. He that would cure this diſeaſe as becomes a *Phyſitian*, muſt not rely upon one method alwaies eſpecially in malignant diſeaſes, but attend to the *differences* of *humane bodies*, *different ſeaſons* of the years, and other accidents which alter mens bodies; and where *humane ſearch* failes us in the diſcerning of the *Cauſes* of that *ſenſible difference* that is obſerved to be in the *ſame diſeaſe* at *ſundry times*, he muſt, with *Hypocrates*, have recourſe to the Τὸ θεῖον, in other caſes to *Diſ-Syncraſies*. Thus in ſome years the *ſmall Pox* is fatall, notwithſtanding the *beſt Methods*: In *other times* ſo gentle, that any Nurſe can cure it. Some years the *Plague* and *Peſtilentiall Feavers* are cured by *Vomiting*, *bleeding*, *purging*, and *Sweating*; In other years *Vomiting*, *Purging*, *Bleeding*, and *Sweating*, have proved pernicious: I ſhall Illuſtrate this out of the two great *Plagues* which happened at *Leyden*, in the *Netherlands*, one in 1624, the other in 1635. In the *Firſt* Plague, all

that had *botches* behind their Eares, under their Armepits, or in their Groine, upon the applying of a veſicatory in a convenient place, and the botch being ſuppurated, and the matter evacuated by the adjoyning veſicatory, the botches vaniſhed without breaking, the malignity and matter contained in the botch venting it ſelf by that other paſſage. In the latter Plague, although upon the applying of bliſters, the ſick amended, and the malignity ſeemed exhauſted, yet did all the botches *ſuppurate* and *break*. In the *firſt* Plague all Women that during their being ſick of the Plague, happened either *orderly* or *accidentally* to have their *Menſtrua*, and all that had the Plague, and did *miſcarry* there, theſe generally died: But in the ſecond Plague, it was quite otherwiſe, many women recovered notwithſtanding their *abortion*; and moſt women eſcaped that had thoſe *Menſtrua*, though it were *Symptomatically*. In the *Firſt* Plague, all that had *purple*, *livid*, or *black* Spots dyed, almoſt. But in the *ſecond*, many eſcaped who had thoſe *Marks*. This *Henricus Florentius* relates upon his *own knowledg* in his additaments to *P. Paaw. de peſte. c. 2. pag.* 47. and with this paſſage I ſhall cloſe up this Animadverſion, referring all inquiſitive perſons to *Forreſtus* and *Schenkius* in their obſervations upon this diſeaſe; whoſe *Cure* is ſo layed down by them out of *Caius*, *Tyengius*, *Viſſenacus* and by *Tho. Cogan*, by *Pareus*, *Sennertus*, *Langius*, *Claudinus*, *Hollerius*, *Langham* in his Garden of health and others, that any one that is *Maſter of a General and diffuſed method of Phyſick*, *acquainted with the generall rules and cautions* and who by a *variety of reading* is acquainted with the *Multiplicity* of *malignant* and *Peſtilential Feavers*, and that infinite diſcrepancy that is obſerved in them, in their *Types*, *Beginning*, *Progreſs*, *Event*, and *Cure*, ſhall not be at any loſs in that diſeaſe, ſhould it return again, otherwiſe then what *human imbecillity* and the intricacy of the *thing* ſubjects him unto. But his *Method* I doubt will not be *almoſt Infallible*. But! what is all this to the *Hiſtorian*?

Hiſt. of the R. S. Pag. 77.

"It was the fear of being circumvented, that made one "of our wiſeſt *Kings* delay *Columbus* too long, when he came

" came with the promiſe of a *new world*: whereas a little " more confidence in his Art, and a ſmall charge in furniſh- " ing out ſome few ſhips would have yearly brought all " the Silver of the Weſt-Indies to *London*, which now ar- " rives at Sevill,

I do not wonder that our *Hiſtorian* hath not read *Holinſhed* and *Polydor Virgil*; but how can he be excuſed for not being converſant in the Lord *Bacon's* Hiſtory of *H.* 7. whoſe words are theſe *pag.* 189. " It is certain that the *Kings* " fortune had a Tender of that great *Empire* of the *Weſt-* " *Indies*. Neither was it a *refuſall* on the Kings part, but " a delay *by accident*, that put by ſo great an *Acqueſt*. For " *Chriſtophorus Columbus* refuſed by the King of *Portugall* " (who would not embrace at once both *Eaſt* and *Weſt*) " imployed his Brother, *Bartholomæus Columbus* unto " King *Henry* to negotiate for his diſcovery. And it ſo " fortuned that he was taken by *Pirates* at Sea, *by* " *which accidentall impediment*, he was long ere he came to " the King; *So long* that before he had obtained a Capi- " tulation with the King for his Brother, the enterpriſe by " him was atchieved, and ſo the *Weſt-Indies* by *Providence* " were then reſerved, for the Crown of *Caſtilia*. Yet this " ſharpened the King ſo, that (not only in the voyage of " *Sebaſtian Gabato*, but) again in the Sixteenth and Eigh- " teenth year of his Reign he granted forth new Com- " miſſions for the diſcovery and inveſting of unknown " Lands.

I do not find *by this Hiſtory* that the King did ſuſpect *Columbus* for a Cheat, or put any *delayes* upon him becauſe he was not ſatisfyed with *his Art*. His Brother having been taken and detained by the *Pirates*, this *Columbus* applyed himſelf to the King of *Spain*, and had Tranſacted with him and finiſhed his voyage, and firſt diſcoveries, before *Bartholomæus Columbus* could arrive and finiſh his Capitulation with *H.* 7. But had that *prudent King* doubted of his Art in a Caſe *not yet tryed*, where the *Diſcovery* ſeemed as *uncertain* as were the length and *incommodities* of the voyage: and where the grounds upon which *He* went,

ſeemed meerly *conjectural*, how could he be blamed? For whatever private Intelligence *Columbus* had from a *Spaniſh* Pilot (that dyed in his houſe) or otherwiſe, *he* (being more deſirous to make his Enterpriſe the *Child* of his *Science* and *Fortune*, then the *follower* of a former diſcovery) repreſented no other aſſurances that all was not Sea from the Weſt of *Europe* and *Africk* unto *Aſia* but *Seneca's* prophecy, or *Plato's* antiquity, or the nature of *Tides* and *Land winds* and the like. The Lord *Bacon* terms them only *Conjectures*, and theſe *Gentlemen* who hold that in thoſe daies there was no Philoſophy about the *Winds* and *Tides* whereupon one would rely, and thoſe antiquities of *Seneca* and *Plato*, being but the dotages of two *Fooles* credulous and apt *to conclude too ſoon*, ſhould not condemn the *deliberate procedure* of *that King*. Eſpecially ſince the diſcovery of the *North-Weſt* though grounded upon better *conjectures* (as my Lord *Bacon* ſaith) then thoſe of *Columbus*, proved uneffectuall in the voyage of *Sebaſtian Gabato* whom the *King* did furniſh out with a ſhip not long after: and ſo hath the proſecution of the *North-Weſt* paſſage ſince that. I think I could evince further out of the condition that *England* was then in, not being ſo populous as of late years, the *Scots* being un-aſſured, *France*, *Spain* and the Houſe of *Burgundy* emulating, if not hating him, and the *Fleets* and *Nawall power* of England being nothing to what it hath *lately* riſen unto, that (conſidering our Scituation in compariſon of *Spain*) it was not ſo eaſy a thing as he imagines, to have poſſeſſed the *weſt-Indies*, and effected that trade and commerce which the *Caſtilian* is now maſter of: but I ſhall not digreſs ſo farr.

Animad-

Animadversions upon the *History* of making *SALT-PETRE*, which was Penned by Mr. *Henshaw*.

THis History of *Salt-Petre* hath so many *defects* in it, that I wonder any one should offer *such an account* to them, and am more surprised to see it approved *by them* and inserted into their *History* as a *Specimen* of their *Narrations* for the world to Judg how *accurate* and inquisitive the *Society*, and its *Members* are. The Narration is not only *imperfect*; but in many parts *false*, so that for ought I can discerne, the *History* of *Nature* which they propose to themselves, will not merit any more Credit (if so much) then that of *Pliny*: and these *Experimentall Philosophers* instead of *undeceiving* the age as to *inveterate Errors* will *multiply new ones*. Hist. *R. S.* Pag. 260.

We are told in their *History* with Hist. *R. S.* Pag. 99.
"what caution they proceed in their Experiments, in
"the *making* of them, and in the *repeating* them: they ob-
"serve all the *Chances* and the *regularities* of the procee-
"ding; what nature does *willingly*, *what Constrained*; what
"with its *own power*, what by the succours of *Art*; what
"in a *Constant rode*, and what with some kind of *Sport* and
"*extravagance*; industriously marking *all the various shapes*
"into which it turnes it self when it is pursued, and by
"how many secret passages it at last attaines its end; ne-
"ver giving it over till the whole *Company* has been fully
"certified of the *certainty*, & *constancy*, or on the other side
"of the absolute impossibility of the effect. *This Critical* and
"*reiterated Scrutiny* of those things which are the plaine *ob-*
"*ject of their Eyes*, must needs put out of all reasonable dis-
"pute the reality of those operations, which the *Society* shal
"positively determine to have succeeded,——Nay, they Pag: 100.
"tell us that there is not *any one thing* which is now appro-
"ved and practised in the world, that is confirmed by

 stronger

"*ſtronger evidence* than this which the *Society* requires; ex-
"cept only the *Holy Myſteries of our Religion.* Whether he intend to preſent the *Holy Myſteries of our Religion* as *fabulous* and *ridiculous* I cannot tell: but whoſoever ſhall reflect upon this *Similitude* and examine the realty of their *Experiments*, and particularly of this concerning *Salt-Petre*, which is a common thing, and the *Inſtance* of their *care* and *exactneſs*, will hardly entertain any kind thoughts of theſe *Projectors*. Juſt as I was writing this, Mr. *Bagnall* had his workmen employed about the making *Salt-Petre* at *Warwick* and *Coventry*, whereupon I conſulted with the Operators and received the ſubject of theſe following *Animadverſions* from them.

As to that Queſtion which he firſt propoſeth, *whether the Salt-Petre which we uſe now, and that of the Ancients, be of the ſame Species?* He might have encreaſed the Catalogue of ſuch as deny it, by adding *Quercetan* in his diſcourſe of *Gunſhot-wounds*, and *Braſſavolus* in his Treatiſe of *Purging* medicines: *Ioel* in his diſcourſe of *poyſons*. As for *Scaliger*, he diſtinguiſheth betwixt *Nitre* and *Salt-Petre*. He ſaith and *proveth* it that the *Nitre* of the Ancients, is not a thing *loſt totally*, but common to be had in *Aſia* and *Egypt* and even in *Tuſcany*. And *Porerius* ſaith, he gathered it in ſeveral places about *Bononia*, and particularly in *Monte Paderna*. And if *Langius* be the Author Mr. *Henſhaw* cites (I never heard of any writer called *Longius*, and am apt to believe it to be a miſtake of the Printer) it is plain that he reckons our *Salt-Petre* as a *diſtinct Species*, and not as the ſame with *that other* of the Ancients. *Eſt et alia Nitri Species* (marke that!) *artis induſtriâ parata, quæ ex ſtirijs frigore in lapidibus parietum aut teſtudinum concretis, ſenſim diſtillantibus, ſaxis et cæmento accreſcit, aut ex putrida et ſalſuginoſa in ſtabulis terra, veterinariorum urinâ conſperſa decoquitur. Novum inventum, veteribus Medicis ignotum.* The diſtinction that *Scaliger* makes betwixt *Salt-Petre* and the *Nitre* conſiſts in the *tenuity of their parts*, and upon the ſame ground he diſtinguiſheth *Salt-Petre* from the number of *Salia Foſſilia*, or Salts digged out of the Earth. *Tantum abeſt, ut ſal petræ ſit ſal Foſſile, ut*

De ſubtil. exercit. 104. *Sect* 15.

Pharmacop. Spagyric. l. 1. 7.

Epiſt. l. 2. *Ep.* 32.

et a Sale et a Nitro diſtet partium tenuitate. Tam enim ſal quam Nitrum ita uritur, ut cineris quippiam relinquatur. Sal petræ univerſum abſumitur ab igni. What the judgment of *Cardan* may be, I know not; But *Untzerus* doth give his reaſons why our *Nitre* and theirs ſhould not be of the *ſame Species*. Becauſe that theirs was ſuch as might be *eaten with meats*, and commonly *drunk with wines*; it was of a *roſy colour*, bitter, light, Spungy, and of an *Earthy Nature*. Whereas our *Salt-Petre* hath none of theſe qualities. As for thoſe that hold the *Affirmative*, their number is not ſo *great* as he repreſents them to be, nor is the *general vote of learned men* ſo favourable to that opinion. But the controverſie is laid aſide, becauſe we have none of *that Nitre* brought over unto us. Should it happen once to be ſo, or that we ſhould meet with any *Veins* of it or *Nitrous Waters* in *Europe* where it were to be digged or made without Lixiviating, it is not to be doubted but there would ariſe ſeveral diſputes about the *Mineral* it ſelf and the bodies, that ſeparate from it upon *refining*. Since there is a great difference in the *Salt-Petre* of ſeveral grounds in *England*, and ſome having a greater proportion of *Common Salt* than others have, and ſome abounding much more with *Sal Armoniack* than others, as the *Barbary-Petre*, or that which is caſt out of the Earth in *Italy*, or hangs upon old Stone walls in *England*: whereas that which is made by boiling, participates not at all of the nature of *Sal Armoniack*. And that *many little differnces* in the *Petre* beſides theſe, might have been offered to the conſideration of the *Society*, and found out by them in order to the improving of Gunpowder, is certain: but they are not ſo *ſerious*, as they pretend. And whereas Mr. *Henſhaw* ſaith that the reaſon why the *general vote of learned men hath been moſt favourable to that opinion of their being but one Species*, was "becauſe "that in all Latine Relations and, preſcrip- "tions, the word *Nitrum*, or *Halinitrum* is moſt "commonly uſed for *Salt-Petre*. I do not believe any "man ever gave that reaſon: For the word *Nitrum* is of

ubi ſuprà.

de Sal. c. 18.

Poterius Pharmac. Spagir. l. 1. *c.* 7.

The *Peter* of *Houſe-floors* and the like which abounds with *Common Salt*, can never be ſo *refined* as to *burn*, or be ſo effectual, as that of better Soyl. The common Salt being in part inſeparable.

Greekiſh originall, νίτρον & λίτρον. The Greeks and Latines cald that peculiar ſort of Minerall, *Nitre*, which was in ſome places digged out of the *Earth*, in others made by the *Sun* operating upon little *Canales* made out of the *Nile*, and oftentimes it was caſt up of it ſelf *out of the Earth* (or bred there) in manner of a hoar froſt, as it is now in the *Indies*, and *Barbary*; the *Arabians* called it *Baurækh* and mention two ſorts, that of *Armenia*, and that of *Africk*. When the uſe of *Gun-powder* had rendred *Salt-Petre* ſo advantagious a commodity, and that modern Artiſts had found out this way of extracting it out of Earth by Elixiviating it, they gave it the ſame appellation that the Ancients did to their *Nitre*, and came to uſe promiſcuouſly the Names of *Nitre* and *Salt-Petre*, both ſorts of *Nitre* being equally ſubſervient to their ends, and being in a manner all one after refining; although *Curioſity* might be able to multiply diſtinctions from the *different manner of productions*, and different *conſtitutive principles* that occur daily in the making *Salt-Petre*. They were the more induced to give our *Salt-Petre* the ſame name with the Ancient *Nitre*, becauſe that they had continued the name of *Nitre* to the ſame ſort of *Minerall*, though ſometimes occurring in a *white* colour, ſometimes *Black*, ſometimes *red*: ſometimes they had it *naturally* produced; ſometimes it was *artificially* generated in their *Pooles* or *Canales*: Sometimes it was of ſo *hard* a conſiſtence as not to diſſolve eaſily in *water*; ſometimes it was *ſoft*, of a looſe texture, and as it were *froathy*. From this conſideration the moderns thought it no *incongruity* if they gave the *ſame name* to their *Salt-Petre*, which the Ancients had given to a *Minerall* of ſo *reſembling a nature*. So *Botallus* ſaith. *Quanquam adhuc ſub judice lis eſt, num hoc noſtrum Nitrum*

Avicen con. med. l. 2. tr. 2. edit. Plempeii p. 71.

I here argue as if our *Salt-Petre* which is Extracted out of Earth by *Elixiviation*, were unknown to the Ancients. And I confeſs that notwithſtanding what *Tartaglia* and *Semienowicz* ſay (whoſe words I ſhall relate anon) I can not perſwade my ſelf but that if they had been acquainted with ſo ſtrang *a Phænomenon* in nature, they would at one time or other have taken notice of this as well as of other waies of gaining *Nitre*. That none ſhould either directly or caſually let fall a word that might convince us that they knew *it*, is a ſtrong preſumption they were ignorant of *it*: and though there be no records that tell us when or by whom it was invented, yet it is more eaſy to comprehend how it ſhould be a *moderne diſcovery*, and yet the Author unknown (a common accident!) then how it ſhould have been known ſo long and yet never ſpoken of by thoſe who have even in the making of *Salt* and *Nitre* taken notice of as minute circumſtances.

Nitrum idem ſit quod veterum, ſenſus tamen indicat hoc facultate illi haud abſimile eſſe. So *Quercetan* ſaies, *Salpetræ noſtrum a Nitro diverſum eſt, niſi quod qualitatum communionem fortè quandam cum illo habet, quemadmodum ſales omnes inter ſe communionem quandam habent. de vulner. Sclopet. Sect.* 10. We ſee in *common Salt* how great a variety is comprehended under the ſame *appellation*. Some is white, ſome black, ſome bay, ſome red, ſome purple, ſome digged out of the *Earth*, ſome made by the *Sun*; Some is bould to its conſiſtence; in the *taſt* there is great difference; ſome more *pleaſantly Salt* than others, ſome *bitter* and ill taſted. Some Salt hath *a rank ſmell*; ſome none at all; and in the effects and uſes to which *Salt* is applyed, there is ſo great a variety and diſcrepancy that we may juſtifie our calling the Common *Salt-Petre* by the name of *Nitre*. In the mean while it is apparent that the Latines could not uſe the word *Nitrum* or *Halinitrum* for that *Salt-Peter* which we commonly make; and they muſt be very *ignorant perſons* that could avow our *Salt-Petre* and the *Nitre* of the Ancients to be of the ſame Species, becauſe that *in all Latine Relations and preſcriptions the word Nitrum* or *Halinitrum* is commonly uſed for (ours? or another kind?) *Salt-Petre*. If ever they had any ſuch it was called *Aphronitrum et Spuma Nitri*: and not *Nitrum*.

vide Laurenbergium in apher. Sal, c. 18.

But however Mr. *Henſhaw* hath done leſs then one would have expected in the foregoing diſcourſe; he would have done more than I, or any other, towards the determining the Queſtion concerning *Salt-Peter*, whether it were the *ſame* or *no*, with that which the Ancients uſed and called *Nitre*. Let us liſten to our *Vertuoſo*, and marke how much the Members of the *Royal Society* ſurpaſs all others of the number of *Literati*. "*If*, ſaies he, *I could have got any* "*Egyptian Nitre at the Druggſters, I doubt not but I ſhould have* "*been able to have put an end to that Queſtion*, by a Demon-"ſtration, *that is by turning the greateſt part of it into Salt-Petre*. Here I muſt firſt inform our *Experimentall Philoſopher*, that the Ancients had more ſorts of *Nitre* beſides that of *Egypt*, as the *Armenian*, *African*, *Roman*, *Babylonian*

Hiſt. of the *R.S.* Pag. 261.

watzer. de Sale, c. 18.

and *Macedonian*; and as to that of Egypt, perhaps besides that *foulenes's* which is likely to adhere unto it by reason of the muddines's of the Nile, there might be so much of *common Salt* in it, as would render that part of his assertion false, wherein he seemes not to doubt but to turn the greatest part of it into *Salt-Petre*. His own Citation out of *Pliny* (*pag.* 263) evidenceth that the *Nitre* of Egypt was the worst, and most remote from our *Salt-Petre*. And when he should have done all this, Yet would his DEMONSTRATION be ridiculous, and be laughed at by every yong Sophister. I shall shape the Argument for him by which the Question is to be decided.

Pliny and *Kircher mund. subterran. l. 6. Sect. 2. c. 1.*

say that the Egyptian Nitre is so solid that it is cut out into Vessels. So the latter. *Nitrum juxta Cairum calore Solis tostum in lapidem, vasis conficiendis aptissimum convertitur.*

Egyptian

Egyptian Nitre may be turned into such *Salt-Petre* as ours is *Ergo, That Salt-Petre which is now in use, and that which the Ancients used, is the same.*

TO paralel this Argument ;is not this as good an inference, I can turn *Sublimate* into *Mercurius currens* or ; *Quickſilver* ſo as that the *moſt part* of it be *ſuch*: *Ergo*, there is no difference betwixt *Mercurius Sublimatus* and *Quickſilver* ; and *Ergo*, whoſoever makes uſe of *crude Quickſilver* makes uſe of *Sublimate*. Or, is not this as good a Demonſtration, *I can turn the greateſt part of Salt-water into freſh*: *Ergo*, *Salt-water*, and *freſh* are the *ſame*: and they that drink the *former*, and they that drink the *latter*, uſe one and the *ſame* drink. Or may I not demonſtrate that the Ancients did *ſeaſon their wines*, and *Eat* that which our workmen call their *raw liquor*, and put the Queſtion out of doubt thus. I can turn *Egyptian*, *Armenian*, or *Macedonian Nitre* into *Salt-Petre* : I can turn the *raw liquor* into *Salt-Petre*:*Ergo*, the *raw liquor* and the other *Nitre* are all one, and they did eat(not *drink*!)this *raw liquor*.I am ſo well pleaſed with theſe kind of *Demonſtrations*, that I cannot but ſuggeſt more of them viz. I can turn *Gunpowder*, the *greateſt part* of it into *Salt-Petre*:*Ergo Gunpowder* is no new invention: & the *Nitre* of the *ancients* & our *Gunpowder* were the *ſame*. Or, I can turn native *Cinnabar* even farre the greateſt part, 13 *ounces* of *ſixteen*) into *running Mercury* or *Quickſilver*:*Ergo*, the *Cinnabar* and *Mercury* are *all one*, and whoſoever uſeth or diggeth up the one, doth *in Specie*, uſe and dig up the *other*. But, what if Mr. *Henſhaw* had lighted upon ſuch impure *Egyptian Nitre*, as upon refining had yielded *more* of *common Salt*, then of *Salt-Petre* (which I ſhall ſhew to be poſſible enough) had he then Demonſtrated the point ? Or would it not have been made *evident* that the *Nitre* of the Ancients

cients, and our *Common Salt*, had been all one? and that when they uſed the *one*, they uſed *indeed*, nay *in Specie* the *other*?

But Mr. *Henſhaw* though he could not get any *Egyptian Nitre*, is apt to think that the Ancients did not underſtand the way of refining their *Nitre*, as we do: and that hence ariſe the different deſcriptions of their *Nitre* and our *Salt-Petre*: which I grant to be true; but yet thoſe *acceſſionall Corpuſcles* of ſo many *different natures*, participating of the natures of *Earth*, *common Salt*, *Allom*, and *Salt Armeniack* (and God knowes *what* elſe) make a very great difference betwixt the *one* and *other*, ſuch, as in the common *naming* of things (even by *Philoſophers*) may well ſerve to rank them as *different*. They will not have the *ſame colour*, nor the *ſame taſt*, nor burn in the *ſame manner*, nor appear in the *ſame figures*; they will not ſerve for the *ſame uſes*, being Chymically Analiſed, they will not yeild the *ſame conſtituent principles*. In fine, and upon which the controverſie moſt depends, It will never appear that *they were both made the ſame way*. So that Mr. *Henſhaw* by his *Demonſtration*, had no way ended the controverſie.

To ſhew the differences betwixt theſe natural productions of *Nitre*, & what *Art* generates, conſider that paſſage of *Kircher*: *in mund. ſubterran. l. 6. Sect. 2. c. 3. Nitrum non purgatum continet ut plurimum tres ſubſtantias, Alumen, Salem crepitantem, et Nitrum eſſentiale, quæ ex ejus diſtillatione reperiuntur: Alumen quippe calcinatur cum fervore quodam et ebullitione: Nitrum purum inflammatur conſumiturq; Sal crepat, exilitq; probat id guſtus Aluminoſus Salſus, nitroſus* — and a little after. *Non eſt Mineralium mixtorum fodina, aut vena metallièa, cui neſcio ſanc qua inſita ambitione non aſſociatur Nitrum. Inter cætera Sali, Aluminì Ammoniaco, cæterisq; Salibus, veluti, cognatione, proximis ſibi non tantum adnaſcitur, ſed ea ſuis divitiis implet.*

To ſhew *his Ignorance* a little more, I would have him to know that the Ancients had not only *dark coloured* and *ſtony Nitre* (which he informes us of out of *Pliny*) but *white*, and of thoſe other *colours* I mentioned out of *Hofman*, and he out of *Galen*. And that the *Armenian* and *African Nitre* would have made more for his purpoſe, ſuch as *Avicenna* and the *Moores* did uſe. And that the *Moores*, did either refine their *Nitre*, or Nature in *Barbary* was kind to them in producing better than yet we receive thence, will appear from the account of *Nitre* or *Baurakh*, which the *Prince* gives.

Nitrum

Nitrum probatiſſimum eſt Armeniacum, leve, cruſtoſum, friabile, ſpongioſum, albo, aut roſeo, aut purpureo colore, mordax: et Africanum quidem Nitrum cum cæteris Nitri generibus comparatum habet ſe veluti Nitrum ad Salem. Non eſtur autem Nitrum niſi magnam gravemq; ob cauſam. Nitri ſpuma eſt tenuior Nitro, ejuſdemq; eſt poteſtatis. Laudatiſſima eſt vitrea (ſome read it molliuſcula) ac fractu Comminutùq; perfacilis.

Avicen: Canon med. lib. 2. tr. 2. pag. 17. Edit. Plempij.

Inſigniter abſtergit, et abluit, præſertim Africanum, et abradit, et purgat, craſſos humores incidit. Atq; omnibus aliis Nitri Speciebus modica ineſt aſtrictoria vis ſimul et abſterſoria, levis propter ſalſuginem, quam habent, præter quam Africano, hoc enim nullius adſtrictionis eſt particeps, ſed purum putam abſtergens eſt et validum: Sali autem adſtrictoria ineſt poteſtas, ſed abſtertorica non niſi levis et modica.

Out of which it is evident that the *African Nitre*, was free from the mixture of *common Salt*, and came very near to our *Salt-Petre* (eſpecially the *Spuma Nitri*, which perhaps was *Criſtalls of Nitre*) in reſemblance and operation; but the *Armenian Nitre* was mixed with *common Salt*. But that they did Elixiviate it out of the Earth I do not finde.

In the end of this page he tell us *that in the refining of* Salt-Petre *there is beſides common-Salt, a certain greaſy Oil attending it, which doth by nature ſo wonderfully adhere to every part of the* Petre, *that the ſeparation of it is the ſole cauſe of the great charge and labour that is required to the refining of* Petre. This is true, but I cannot find that our *Salt-Petre men* do call that *Oil* the *Mother of Salt-Petre*, but quite another thing, which I ſhall explaine hereafter.

Pag: 261. 262. Hiſt. of the R.S.

In that other way which is followed by *Pietro Sardi Caſimirus Semienowicz* and *Agricola* and other Forreigners, there is not that trouble in the making nor thoſe *Mothers* that occurre in ours.

I cannot but take notice of that citation which Mr. *Henſhaw* makes uſe of out of the Exercitations of *Scaliger*. *Subluſtris purpuræ quaſi Splendor quidem in Salis-Petræ terris ſæpenumerò eſt a nobis obſervatus.* This is perfect falſification of the text in *Scaliger*, & occaſioned by Mr. *Henſhaw* his not underſtanding well the Latin-tongue: *Scaliger* doth not hold that *Salt-Petre* is a *foſſile Salt* as he reputes the *Nitre* of the

De ſubtil: exer. 104. Sect. 15.

Ancients to be; but to be a more *ſubtile* Efflorescence ſticking upon the rocks, and dried by the Sun, and therefore called *Sal Petræ*, differing from the other in ſubtility of parts, (as I related before) and hanging upon the ſtones like *Icicles* which are in Latin called *Stiriæ*, & *Cirri*: but Mr. *Henſhaw*, not knowing how to Engliſh the word *Cirri*, nor having Patience to learn, Subſtitutes *terris* for *Cirris*, the text running thus. —— *Sal foſſile Sale marino Craſſius eſt, tum propter coctionem, tum proter materiam: huic enim aquæ, illi terræ plus. Utrunq; autem ipſo eſt Sale-Petræ minus tenue. Sudor enim eſt a Nitri quibuſdam principiis ſecundum aliquam proportionem, ſed adeo tenuis, totus ut Spuma ſit, totuſq; abeat in ignem.* —— *Quod hæret rupibus, in quibus inſolatur, ac propterea Sal petræ dicitur, analogiam habet, atq; affinitatis naturam cum ipſo Nitro, ſed aëreum magis eſt, atq; ad Aphronitri potius veterum ſpeciem vergens. Etenim ſubluſtris purpuræ quaſi ſplendor quidem in Salis Petræ Cirris ſæpenumero eſt a nobis obſervatus.* Out of which it is manifeſt that Mr. *Henſhaw* altered the text groſly, and that *Scaliger* meant no more than to compare thoſe *Cirri* or *Stiriæ* or *Icicles* of *Nitre* with the *Aphronitrum* of the Ancients. And however thoſe *Cryſtalls* are *white* with us in our houſes, yet to evince that they may be as well of another colour, as the *Aphronitrum* deſcribed by the Ancients, he ſaith, he had often obſerved in the *Salt-Petre* as it *Chryſtalliſed* on the rockes a colour inclining to *purple*.

Hiſt. R S Pag: 262.

"And he that ſhall boyl a *Lixivium* paſt through a *Salt-*
"*Petre*-Earth, up to a conſiſtence without filtring it through
"aſhes, or giving the Salt leave to Chryſtalize, may perhaps
"find ſomething not unlike the *Nitre* of the Ancients.

I never *thought highly* of the obſervations of *theſe men*, and Mr. *Henſhaw* here ſerves me with an *inſtance* ſo pregnant that I cannot paſs it by. He pretended in the foregoing page to much converſe with the *makers* and *refiners* of *Salt-Petre*, and to ſome curioſity in his *own Experiments* about it, but (alas) how vaine are his pretenſions! how ſuperficiall his enquiries and obſervations! how little of accurateneſs is there in thoſe *Scrutinies* which

ought

ought to be ſo *Criticall* and *Severe*? where is that Certainty which we are to have from *them*, inferior to *no proofes*, but what convey unto us the *Holy Miſteries of our Religion*! He obſerved before that there was a certain *greaſie Oyl* in the *Minerall*; That Oyl is of ſuch a nature, that if it be not ſeparated from *Petre* it will never *Coagulate* into any *Cryſtalls*, or *imbody*: (I ſpeak of our *Petre* to which he referrs us) and it is his own own obſervation (*pag* 273) that after the *Salt-Petre* Liquor is Cryſtallized, there will remain ſome part of it that will not *coagulate*, being *greaſie* and *it muſt again paſs the aſhes before it be boyled, or it will never generate any Salt*. The truth is *Salt-Petre* is one of the moſt odde *Concretes* in the world, exceeding *Sugar*: And howſoever Nature, and the Sun in the Earth, or *Nitre-panns* at *Nile*, may tranſcend our Art in the production of it, (the peculiar *Aire* of the *Climate* concurring) yet with us it is not made with that facility Mr. *Henſhaw* here inſinuates. After the Workmen have extracted their *Lixivium* out of the *Earth* in ſuch manner as Mr. *Henſhaw* deſcribes afterwards; they boil that *raw Liquor* according to what he ſaies, two daies and a night: and when it is boiled to the height, *though it ſtand never ſo long in the cool*, it will not Chryſtallize or Coagulate into any Lumps or Maſs, notwithſtanding that it is impregnated with a *vaſt* quantity of *Salt-Petre* and *common Salt*, by reaſon of that greaſy Oyl: To evince this, there needs no more but this Experiment, which is well known to the *Salt-Petre-men*; if any *one* will caſt a little greaſe, or tallow into the boiler, when the liquor is *paſt the aſhes* and depurated, and boiled to the heigth, it will hinder the coagulation of it, nor will it ever become *Petre*. This *Liquor* thus boiled up, and *as yet impure is* kept by them for the *Mother of Salt-Petre*. Having prepared this impure Liquor and boiled it up *as to a proofe* as they call it, they put it into a Tubb, which they call the Mother Tubb. And this will never coagulate, nor Cryſtallize, but is called the *Mother* of *Salt-Petre*.

This Experiment of caſting in the *greaſe* will not ſucceed in the refining, but in the firſt generating of the *Salt-Petre*. Beſides it will boyl over with that violence that they know no way to allay it: This happens more if *Soap* be caſt in.

And that for this reaſon, becauſe that to make *Salt-Petre*, they boyl another Copper-full to the juſt heigth, and when it is come to *that*, they put into it ſome of *this Mother*, and (as ſoon as it begins to boil) they lade away as faſt as they can the whole liquor into their Aſh-tubbs, which when it is paſſed through, it will at the ſecond boiling, let fall the *common Salt* and *Salt-Petre*, as he and I ſhall declare preſently. At *Warwick* they boiled nine tun of *raw liquor* at once, and when this proportion was boiled to an heigth, they put in about half a tun of the *Mother*, and ſo made it. This is the way to produce the *Mother* when they are deſtitute: But when they have once made *Petre*, they keep that Liquor which remaines after the *Cryſtallizing* in the *panns*, that is kept in *Tubbs*, and is called the *Mother of Salt-Petre*, and this they carry about with them whereſoever they go, thereby to ſave them the trouble of making *new* in the manner I deſcribed. Having declared thus much in order to the generating of *Salt-Petre* amongſt us, I leave my reader to judge how much Mr. *Henſhaw* clears up the matter by his imperfect accounts from *Barbary* and *Pegu* about the natural productions of *Nitre*. In which I obſerve that there is no account given of the nature of the *ſoile*, nor of thoſe *corpuſcles* that impregnate the *Aire* there, nor of the *times* of the year in which it is generated, nor of the influence that *change* of *winds* and *weather* hath upon it. Nor how deep the *veines* of it lie, whether it be only generated in the *ſurface of* the *Earth*, and *propagate downwards* or whether it *generate* lower and propagate *upwards*. Whoſoever ſhall make theſe reflections *with me* (and they are but neceſſary: I remember that where the *Sun* makes *Salt* in *Jamaica* at the *Salt-panns*, the times of the year and ſeaſons of weather made

This *Mother of Salt-Petre* is not ſo called, as if the Elixiviated Liquor having been boiled and paſſed the *aſhes* and after boiled to *a proofe*, would not let fall the *common Salt* and coagulate into *Petre* at all: but becauſe by theſe meanes it generateth a great quantity of *Petre* and the work is made much more eaſie. And it is obſervable that the *Mother* which remains after the generating of *Petre* is much more Efficacious then what is made otherwiſe. If the raw Liquor be, by negligence boiled too high it will become extream *Oily* or *greaſie* nor can it be cleared of it by aſhes, except it be put in as *Mother*, to other boilings, and ſo *paſs the aſhes*. If the *Mother* be put in *too ſoon* it ſpoils the *boiling*; and if it boil *in* after tis at the height, it will over the *furnace*.

made a great alteration) he will think that it is not for this *Vertuoso* to blame the *Ancients* : And let any man consider the account which *Pliny* gives, as Mr. *Henshaw* cites him, and he will find even *that man* (as much, and as justly as he is condemned) was more accurate then our *Historian*. And if the learned *Theodorus Collado* passed this Censure u pon *his naturall History*; viz. *Opus recreandis curiosorum animis, non Erudiendis Scientiæ cupidis, idoneum : nec Philosophicum, nec medicum, sed Historicum. Vir equidem fuit Studiosissimus ; sed aliis in rebus occupatissimus (assiduitatem autem in Stadiis artis requirit in medico* Hypocrates) *Aliquamdiu causas actitavit, ut de ipso* Plinius *alter ad* Cæcilium *(at necessaria est in medico, ait* Hypocrates, παιδομαθίη, *didicisse artem à pueritiâ) tantum* 56. *Annos vixit, breve tempus : Junior Erat quum Scriberet ;* (at ars longa) *Totum illud tempus distentus impeditusq; quâ officiis maximis, qua amicitiâ principum egit, in Germania militavit. Itaq; horis succisivis, ex variis collegit authoribus pulcherrima quæq; suo arbitrio, lectuq; grata in unum digessit, per capita, nihil ex suo attulit : sed non potuit per otii angustias res exactè ponderare, et elimare : Sæpè autores aut linguarum imperitiâ, aut sensus sermonum ignoratione, non intellexit, ut optimè in materiâ simplicium, Ruellius Dalechampiusq; annotarunt: in aliis partibus alii.* I say if this *Character* be Justly fixed on *Pliny* ; what credit will *some* deserve who are farr inferiour *in parts*, in *Judgment*, in *learning*, and in *curiosity* to *Pliny*.

in append. adv. Laurentium *de Error practic. c.*78 Sect. 6.

How will they be abused by *Artisans*, as *Pliny* by his authors ? how much *knowledge* and *Skill* is requisite to enquire into the circumstances of *Mechanicall* productions ? how much more to relate them ? I could not avoid this digression, which any one will pardon, who considers what Just cause Mr. *Henshaw* gave me.

But I pray, which sort of the Ancient *Nitre* doth he think our *impure liquor* (if it were coagulated) would resemble ? Since they had sundry sorts : as there be severall kinds of *Salt*, some digg'd out of the Earth ; some made by the Sun out of Sea-water in the *Salt-panns*; some boiled out of Salt-springs; some made out of plants calcined: so there

were ſeveral ſorts of *Petre* very much differenced in taſt, colour, weight, ſhape; as I have ſhewed. The *African* was the beſt, and comes neareſt of all to the *Aphronitrum* of the Ancients. Of this *Aphronitrum* I ſhall adde as little to what Mr. *Henſhaw* ſaith, as he does to *Pliny*; they that have ſeen it can Judge better of it, then they who have not; but that which they found upon the rocks, and which *Scaliger* ſpeaks of, was much different from what we obſerve in *England* in Vaults, and Arched Cellars or Walls. For that with us ſeems to be but the tranſudation of the *Saline* particles of the Lime and coagulating with ſome corpuſcles in the aire, into an *hoare*, or *Chryſtalls*; Nor did I ever ſee any but what was *White*: nor could I obſerve it to ſtick naturally to the Wall but in dry weather or when I made conſtant fires in my Chamber at *Oxford*, where it grew on the Walls near the ground, the Earth being higher much on the outer ſides, then the floore within. At other times I ſuppoſed it too much diluted with moiſture to ſtick on the Wall. But their *Aphronitrum* was of other colours, and grew out of naturall rocks and Vaults, and ſuch was that which *Scaliger* ſaw. It is no ſtrange news that Mr. *Henſhaw* drew very good *Rock-Petre* out of thoſe *Stiriæ*: nor is it any thing remarkable that a *Phyſitian* in *Shrop-ſhire* ſhould frame a *Sal prunellæ* out of them, except he had given us an account of the differences betwixt that ſort of *Petre*, and the *common* ſort: As to the *Cures* he did with it, I would faine know whether they were ſuch as could *not have been done* without it? and whether they were effected by that alone? or with the concurrence of other medicines? If the laſt, how comes the *Cure* to be aſcribed to that *Sal prunellæ*? perhaps it was not Effected by it *at all* or *in part* only. If the *Cures* were ſuch as might have been effected *by other meanes*, or by other preparations of common *Nitre*, what ſingular news did his *Shrop-ſhire* Phyſitian tell him? Every man of underſtanding knowes that crude *Petre* is as good, or better than that which is prepared by that *calcination*, with *Brim-ſtone*. And it is an uſuall way of cheat with the Chymiſts by ſome little altera-

alteration in a Medicine, to pretend unto *Miraculous* discoveries in *Physick* and *such Cures* as never man performed besides, or before; and sometimes *their* medicines are but *old ones* though boasted for *new*. Such was that *Arcanum* of *Ivy-berries* which was whispered into Mr. *Boyle's* Eare for a *secret* against the *Plague*: which yet was not only the secret of *Helmont* (as he observes) but was commonly used in *England* in a Plague which happened *Anno Domini* 1540. As my *old receipts* say. It is in the *Garden of Health*, and other *English* receipt-books that are in Print. It is in *Alexius Pedemontius's* secrets *lib.* 1. and out of him transcribed by *Antonius Schneebergerus* in his Catalogue of *Euporista* against the *Plague*. It is not easie to be imagined what a pudder *some men* make about a small matter; and certainly much *learning* and *knowledg* were a thing very desirable *in this age*, when a little goes so farr (being set off with impudence) and acquires a man so *great repute*.

"In the *torrid Zone* and barren deserts of *Africa*, the sands "are visibly full of *Nitre*, and those few Springs and Wells "that are to be found there, are *by that reason* so *bitter*, that "the *Moores* and their Camells are forced to make an hard "shift with them in their long journies. —— I do not understand the force of the Argument for the *bitterness of the Springs* from the *Nitrosity of the ground*; since *Springs* commonly participate not of the nature of the *adjacent soile*, nor have their *Originall* where they *discover* themselves: So *Salt-Springs*, and *Hot-springs* are found in places where the *cause* cannot be ascribed to the *Soile*, by reason of the many other Springs thereabouts that are of a different nature. And although *Baccius* be of his opinion, that the *bitterness of these Springs is from Nitre*: *plures inter Rubrum mare et Nilum amaræ aquæ inveniuntur, ob substantiam Nitri quod in illis maximé partibus abundat, saporis exactè amari.* Yet I cannot assent to it, for this reason, that neither the lake in *Macedonia*, nor *Nile* (in which *Nitre* doth naturally coagulate) neither of them are said to be *bitter*: particularly the *Nile* is esteemed the best water in the world *Suavissima illius fluminis aqua, quæ alijs omnibus videtur*

Hist. of the R. S. Pag. 264.

detur præferenda. Alpin. de med. Ægypt. l. 1. *c*, 10. Yet this *Nile*, (Mr. *Henſhaw* ſaith) waſhes the *Nitre* out of thoſe deſarts, and ſo becomes impregnated in ſuch manner, as is related. Beſides, *Salt-Petre* it ſelf hath no ſuch taſt; nor the *boiled liquor* of it: and *Fallopius* ſaith, that *Salt-Petre* is rather to be diſcovered in *waters* by it's *effects*, than *taſt*; For if it ever ſhew it ſelf to the *taſt*, it is by a certain *Saline purging*, and as it were a *gently* corroding acrimony, which affects the tongue, and with a quickneſs diffuſeth the freſh ſence of it, as *Salt-Petre* it ſelf does. If *Nitre* ever makes water bitter, it is by reaſon of ſome *heterogeneous* mixture.

Gabr. Fallop. de thermis c. 9.

Hiſt. of the *R. S* Pag. 265.

"He obſerves that *Lime* doth ſtrongly attract the corpuſ-
"cles out of the aire, which either are *Salt-Petre*, or make it. —— I wonder how this paſſage came to be approved of, ſince that when I made uſe of the like principles, in an account of ſome naturall *Phænomena*, relating to *Jamaica*, the publiſher of the *Philoſophicall tranſactions*, fixed a *Marginall* reflexion upon me as not ſolving the thing *Mechanically*.

He tells us that *Salt-Peter* is the *life* of *Vegetables*, and that the face of the Earth could not produce them, if it were not for this *Salt*. Yet (*pag.* 266.) he tells us that in clay, or Sandy Earth little of it is to be found: & it is certain that our clay-grounds (that are of a very Stiffe clay, as in *Northamton-ſhire*) yeild as good Corne as any in the world; and as good paſture ground, and feed as large ſheep, and as large a breed of Horſes, as this Nation boaſts of. And I have ſeen in places in *Jamaica*, where there is nothing of Earth or mould, but immediate rocks under the ſand, I have ſeen *prickled peares*, *Mangraves*, & other trees grow, and *Melons* alſo. So all grounds that are *Gravelly*, or full of *Springs* yeild no *Salt-Petre*, yet do they *abound* in *Plants*: and even in *pure water* Mints will grow very ranke, in which the proportion of *Salt-Petre* is very ſmall, as he confeſſes.

Hiſt. of the *R. S.* Pag. 266.

"Husbandmen might make double or treble the profit
"they uſually do of their *muck*, if they would lay it up un-
"der an *Hovell* or ſome *covered place* until they cary it out upon

" upon their Land. —— I would not have any man think that this improvement of a *muck heap* is the particular observation of a *Member* of the *Society*, for which all *Farmers* are redevable to hem. It was a thing known long agoe, and publiſhed by the Writers of *French* and *Engliſh* Husbandry. Not to mention others, take the words of Sir *Hugh Plat*, who lived in the daies of *Queen Elizabeth*, in his *Jewel Houſe of Art and nature*, pag. 94. " All thoſe " ſimple Sorts that leave their *muck-heaps* abroad, and ſub- " ject to the weather, ſhew themſelves to be but mean *Hus-* " *bandmen*, and that they never taſted of any true natural " Philoſophy. For the Rain that falls upon thoſe *Dung-hills* " flowing down into the Vallies, doth alſo carry with it " the Salt of the *Dung*, which diſſolveth it ſelf with the moi- " ſture : wherby the ſoil being afterwards laid abroad up- " on the land, doth little or no good upon it. But if thou " wilt not give credite to my Speech, yet mark how the " labouring Hind, when he carries his *Dung* to the Feild, " how in diſcharging of his loads he leaves it in cer- " tain heaps together, and a while after he comes to ſpread " it all over the ground, and layeth the ſame in equall le- " vell, and afterwards when the field happens to be ſowed " with Corn, thou ſhalt alwaies find the Corn to be more " green and rank in thoſe places where the ſame heaps " were firſt laid, (after they have lain there ſome reaſona- " ble time) then in any other place in all the ground be- " ſides : and this comes to paſs by reaſon that the Rain " which fell upon them hath carried even the Salt through " them, and conveyed it into the Earth that was under " them.

" I have been told by an experienced work man, that no " placeyeilds *Petre* ſo plentifully as the Earth in Churches. ---This was told Mr. *Henſhaw*; but as *Experienced* a man told me, that it was *falſe*; & particularly at *Coventry* lately. *Pigeon-houſes* yeild much more; and even here we muſt diſtinguiſh : for if a *Pigeon-houſe* be built on *Springs* or *Gravel*, either

Hiſt. of the *R. S.* Pag. 266. At *Coventry* in a Floor where they couched *Mault*, there was ſo much *Petre* that it was viſible to the Eye in great-plenty: and the men came to deſire the *Salt Petre*-men to work it, becauſe he found it prejudiciall to his *Mault* which was not ſo good as when the Earth was leſs *Nitrous*.

there will be none at all, or little *Petre*: The like distinction is to be used in reference to the Scituation of *Churches*: *Salt-Petre* is begot in the Earth by a kind of *fermentation*. Stiffe *Clay* hinders that, and *gravell* is either of nature that *imbibes*, and *destroies Salt*, or else it is too *open*, and so gives a *vent* for those particles to *exhale*, that should *ferment*, and by fermentation transmute or Combine themselves into *Petre*, as also derive some principles out of the *ayre*, which contribute thereunto.

Hist of the R.S. Pag. 266

"Let the Earth be never so good, if it be laid on a brick "Floor, or that is boarded, it will not be so rich in *Petre* "as if it have free communication with the Exhalations of "the lower parts of the Earth.—I am not satisfied that the streams arising from beneath concurre to the production of it, because that the generation of *Salt-Petre* begins at the top, and from the surface of the Earth *multiplies* it self by *fermentation downwards*, which is the reason that the *lower* you descend, the *less* you find; Mr. *Henshaw* confesseth that if the ground be good, it seldome exceeds ten Foot in depth; commonly but six, or eight Foot: In *Warwick* (which stands on a gravell) it descends not above one Foot, as they assured me, though it be rich in *Minerall* at the surface. Besides in *Warwick-shire* there were Pigeon-houses that were floored with stone and with pebbles which yeilded as much *Petre* in proportion as any others.

He might have observed that the more *Southward* you work for *Petre*, and upon the Sun (as they Phrase it) the richer the ground is in *Petre*. And how old Mud-walls gather so much *Petre*, that it hath countervaild the cost to pull some of them down, and after rebuild them. The Elixiviated *Ashes* laid in the *Sun* impregnated with the *Oile* and *filth* only, will in a short time breed *Petre* in the top, if no *Rain* fall.

"If the Earth taste *bitter*, he is sure to have good store of "*Minerall*. —— This is not true, for the Earth hath not any bitter taste, but *Saltish* and pungent, with a quickness, such as is in *Salt-Petre*, Especially if you imagine in it a mixture of *common Salt* more or less, according as the Earth is.

He

"He that ſhall caſt Water upon a Ground fit to dig for
" *Petre*, will only ſink the Mineral deeper into the Earth; but Hiſt. of the R. S. Pag. 267.
" he that throwes Soap-ſudds on it, will quite deſtroy the
" *Petre* (as the Workmen have a Tradition) and it very well
" deſerves a further enquiry. —— It is impoſſible for Mr. *Henſhaw* to minde what he ſaies, I think. If any man caſt on *much water* into a *rich Earth*, the water will not waſh it only *deep* (water deſcends not very deep) but diſſolves the *Petre*, and Soaks quite away *with it*, for that time. As for the caſting *Soap-Suds* on the ground, that it deſtroys the *Petre* either for *ever*, or for that *time*, any more then much *water Spilled* would doe; it is but a fooliſh ſurmiſe: for ſhould one caſt *Soap-Suds* into the *Tubbs* as the *raw liquor* is extracting, it would do no harm; the greaſe thereof not deſcending with the liquor, but lodging in the remaining Earth. But ſhould any one caſt *Soap* or the *Suds* into the *boiling liquor*, it would not only boile over *irreſiſtably*, but never *coagulate*. So *Soap* (or *Sugar*) caſt into the *Churne* is obſerved by Mr. *Scot* to hinder the *butter* to come.

" That *Salt-Petre*, and the way of drawing it *out of the* Hiſt. of the R. S. Pag. 267. 268.
" *Earth*, now in uſe, was a moderne invention, is generally
" concluded by all Authors; but whether we owe it to
" chance, or the ſagacity of ſome great Witt, is as un-
" known, as the time when it was firſt diſcovered.

" It ſeems to have many years preceded the Invention
" of Gunpowder, which by the *Germans* is aſcribed to
" *Conſtantine Autlitzer*, or *Berthold Schwertz* a Monk of
" *Friburgh*, and was, in all probability, not long diſcovered,
" when the Inventor (as *Polydor Virgil* tells us) taught the
" uſe of Guns to the *Venetians*, at the Battail of *Foſſa Claudia*,
" when they obtained that notable Victory over the *Geno-*
" *veſes Anno* 1380. For there is mention made, both of
" *Salt-Petre* and *Aqua fortis*, in the writings of *Geber*, a
" *Spaniſh Moore*, and an *Alchymiſt*; but at what time he
" lived, is unknown, though it be certain, ſome hundreds
" of years before *Raymund Lully*, who lived about the year
" 1333 and publiſhed ſome of his Books wherein he treats
" of *Salt-Petre* and *Aqua fortis*.

Vide Casimirum Semienowicz Art: m gn: Artell, l. 2. c. 1. Pag. 61

It is apparently false even out of Mr. *Henshaw*, that *Salt-Petre* is no *modern Invention*. Nor can any man say so who knows that it is mentioned in the *Scripture*, in *Pliny*, *Aristotle*, *Seneca*, *Dioscorides*, *Galen*, *Vitruvius*, *Philostratus* in the life of *Appollonius Tyanæus*, *Avicenna* and many others, too tedious to recount. Nor is it less impertiment, that a *Witt* should speak it as a strange thing that *Geber* (who by the way, was no *Spanish Moor*, but an *Apostate Grecian*, as I shew Mr. *Glanvill*, and I believe never in *Spain*, but in the Kingdome of *Fez*; and living one hundred years after *Mahomet*, could not precede *Raymund Lully* but by very *few hundreds of years*) that *He* should mention *Salt-Petre*: though the mention of *Aqua-fortis* in him carry something of *remarque*. I demand of our *Vertuoso* whether *Geber* saith that the *Salt-Petre* in his daies was *extracted* and made as now? If he do not (as I am confident *He used* the *African-Nitre* mention'd by *Avicenna* and others) what needed he tell us that *Salt-Petre* is spoken of by *Geber*, whereas he had before demonstrated *it* out of *Pliny*, and shewed himself inclined to their Judgment who taught that our *Nitre* and that of the *Ancients* were *all one?*

A more *Logicall* head would have thus delivered the thing here proposed by Mr. *Henshaw*.

There are several *Mineralls* that are called by the name of *Nitre*, or *Salt-Petre*: betwixt which the more accurate (that is the *Ancients*) did distinguish; so that *one*, the more *impure* was called *Nitrum* and *Halinitrum*; the more pure *Aphronitrum*; the most pure *Spuma Nitri*, or ἀφρὸς νίτρε, as *Dalechampius* observes. The *Nitre* or *Halinitre* was in Lapideous bodies sometimes digged out of the *Earth*, sometimes made by the *Sun* in the *Nitraria* or *Canals of Nitrous waters*. Of this last some being a better sort than others was called *Aphronitrum*, and was more freed from *common Salt*, and was gathered (as I may say) in the *Nitre pannes*, as it shot there in *Lumps*. Besides this there was a third sort of *Spuma Nitri*, which was the best of all: *Quæ maxime laudatur: antiqui negabant fieri, nisi cùm ros cecidisset prægnantibus nitrariis, sed nondum parientibus*. So that it

Plin. l. 31. c. 10. lit. H.

vide Galen. de Simpl. medic. l. 9.

Pliny l. 31. c. 10.

seems

times they took the first small loose concretions for the *Spuma Nitri* before they came to larger *Chrystalls*, or *lumps & stones*: upon which account *Galen* saith it is like to *Wheat Flower*. Of this fine *Spuma Nitri* (which I confess is sometimes *Aphronitrum*; but not with *Acribology*) it was found afterwards that it might be had in *Vaults*, distilling from the stones in *Ice-ickes*. And from hence, as also because it was found transfuding and coagulating on rocks, it came to be called by the Barbarous *Latines* after the *Moores* had taught them *Physick*, and the *Materia Medica*, by the name of *Sal-Petræ*. Besides these waies of finding *Nitre* there is another way of making *Nitre* out of *Elixiviated Earth*, which upon refining is brought to that purity as to equall the best *Spuma Nitri* and *Salpetræ*, the Earthy particles and *heterogeneous mixtures* of *common Salt*, and other corpuscles that diversified the *taste* and *colour* and *qualities* of the former *Nitres*, being *generally* seperated from this: *Art equalling, if not exceding the productions herein of Nature*. How much the *Salt-Petre* of the *Ancients* differed from *ours*, is not now to be discussed anew: certain it is that the Invention of *Salt-Petre* (in it self) nor of any of those natural productions of the *Spuma Nitri*, is not *moderne*. Nor did *any Author in the world*, till *these* appeared, *conclude so*. But as to this *Elixiviated Salt-Petre* whether it be the *same* with that which the *Ancients* commonly speak of, hath been questioned; and I have already illustrated the point. And whether the *Ancients* were acquainted with the present manner of *Extracting and refining it out of the Earth?* this hath been disputed by many; and it is affirmed by most to be a *moderne Invention*, yet so as that *Tartaglia* saith *they knew it as plainly as they did Betony*. And the already mentioned and most diligent writer about Gunpowder saith, *Quod autem existiment nonnulli hunc Salem nostrum Pyrotechnicum esse recenter adinventum illud maximè falsum esse, vel hoc unicum argumento est, quod historici fide digni inventorem Pyrii pulveris vel summis laudum deprædicent encomiis, vel tot convitiorum execrationumq; nominibus proscindant, non quod Salis Nitri novam aliquam invenerit*

vide Semienowicz. ubi supra Pag 63.

See his judgment hereafter, in his discourse.

Casimir. Semienowicz art. magn. artiller. part. 1. l. 2. c. 1. pag. 63.

venerit Speciem ad perniciem Extirpationemq; humani generis, ſed quod novum, necdum antehac uſitatum pulveris nitrati, ex certis Nitri (jam tunc optimè noti) Sulphuris carbonumq; portionibus mixti commentus fuerit compoſitionem. This Book was Printed at *Leyden* in 1650. and from hence any man may Judge how *true* that generall expreſſion of Mr. *Henſhawe's* is, that *generally all Authors conclude it to be a modern Invention*: and how impertinent that allegation of his out of *Geber*, and that oſtentation of learning, is, in computing the time of *Geber* and *Lullie's* lifes: wherein he miſtakes too, for if we abſtract from the authority of *Leo Afer* (to which I ſubmit) it is not certain (or rather it is manifeſt to the contrary) that there did ſcarce intercede *two Centuries* betwixt *Geber* and *Lully*, if ſo much.

vide Eraſtum de metall. Pag. 111.

As to that he ſaith about the Invention of *Gunpowder*, it might have become our *Vertuoſo* to have compleated his *Hiſtory*, by taking notice of what our Country-man Dr. *Read* ſaith of it before that *German Monk*. I will endeavour herein to ſupply his omiſſion of a paſſage that hath ſomething of *curioſity* in it.

Dr. Alexander Read of wounds *Sect.* 15 Pag. 107.

"*Bertholdus Niger, Schwarth*, or *Black* by Sirname. *Anno* "1380. a Franciſcan Frier, and an Alchymiſt, found out "the making of *Gunpowder*, and *Ordnance* which are now "in uſe: He only *perfected* this miſchiefe: for the uſe of "*Guns*, although *rude*, was before: For in the time of *Caro*- "*lus Magnus*, *Gamoſcus*, King of *Friſland*, killed the Count "of *Holland*, and two of his Sons with a piece, and *Roger* "*Bacon* who died about the year of our Lord 1284. maketh "mention of *Gunpowder*. *Nauclerus* affirmeth *powder* and *Ord*- "*nance*, to have been Invented in the daies of *Otho* the "Fourth, *Innocentius* the third, in the year of the Redemp- "tion of mankind, 1213. *Froiſſard Anno* 1340 and 1353. "maketh mention of Guns. *Petrarcha* who died *Anno* 1374. "doth the like. (*a*) You may read in the Hiſtory of *Alp*- "*honſus* King of *Caſtile*, when he beſieged *Algezira*, a famous "town of the *Moors*, 3 *Aug. Anno* 1342. that they in the "town ſhot out of it bullets of Iron out of *Ordnance* accor- "ding to *Mariana*. Yea *Petrus Matterus* affirmeth that

(*a*) *Sethus Calviſius Chronolog* Pag. 752. Co. 2.

Braſs

Braſs *Ordnance* have been uſed by the *Chinoies* many ages ago. So that the Frier was not the *Inventor*, but *Perfecter* of *Guns* and *Powder*. I have not opportunity to inquire into the citations of Dr. *Read*, but if I had been to write the Hiſtory of *Salt-Petre* and of *Gun-powder*, I ſhould have thought my ſelf obliged to *this inquiry*, as much as to that which Mr. *Henſhaw* begins with concerning the *Nitre* of *the Ancients*.

Here I muſt make a Proteſtation about the making of *Salt-Petre*, that I will not be underſtood to oppoſe Mr. *Henſhaw* in any way, but ſuch as is commonly followed in *England*; there is another manner of ordering it in *Agricola de Re metallicâ lib.* 12. page 454. which if it produce any *Phænomena* different from my obſervations, I do transfer all the *diſcrepancies* upon the variety of the proceſs, and profeſs my own integrity and Candour in what I ſuggeſt. It ought to ſuffice that the men Mr. *Henſhaw* converſed with all, and thoſe that made it at *Warwick* did take the ſame courſe.

Pag. 268. That of *Agricola* doth agree with that of *Petro Sardi*. which I have added in the end of this diſcourſe.

"If you are curious to know how rich your Liquor is be- Hiſt. of the *R. S.* Pag. 269
" fore boiling, you may take a glaſs-viall, containing a
" quart, fill it with the common Water you uſe, then weigh
" it exactly; next fill the ſame glaſs with your liquor, and
" find the difference of weight which compared with the
" quantity of all your *liquors*, will give you a very near
" gueſs, how much *Salt-Petre* you are like to make by that
" boiling.——— This is a very *vain Experiment*, and at beſt can hold true only in the *richeſt mould* that is found in *Pigeon-houſes* in which there is little of the *Cubique* or *Common-Salt*. It ſeldome happens that their *raw liquor* contains nothing but *Petre*. They have oftentimes as much of *common Salt* as *Petre*, ſometimes *more*, as in the *raw liquor* drawn from the *floores of ſome houſes*. But beſides the *common Salt* there is the mixture of other *filth*; and the *greaſy Oile*, which will render the weight uncertain: except we think that the *Salt* in the *Aſhes* ſupplies all that is loſt in the *percolation*. It had certainly become our *Vertuoſo* to en-

If the *raw liquor* be made with the *two parts* extracted from *Pigeons* Earth, and *one* out of floores and the laſt contain much *common Salt*, the *Pigeon-houſes liquor* cuts out (as they call it) or *tranſmutes* even that *Salt*, ſo as that there will be little or none in the end.

quire what became of that *greasy Oile*; and what happens to the *Alcalisate Salt* in the *ashes*, since it is turned into *Salt-Petre* in the operation; at least it is certain that as it is *totally* drawn out in the *percolation*, so it doth not turn into *Cubique Salt* except the *raw liquor* be of a *peculiar* sort; as I have said.

Hist. of the *R.S.* Pag. 270.

" When you have boiled it up to that height, that a " little of it flirted off the finger upon a live Charcoal, " will flash like *Gun-powder* (which for the most part falls " out to be after two daies, and a nights boyling.) ——— It is strange that any man should write such a thing as this: first, let the *liquor* be never so rich of the *Mineral* which seldom happens, and void of *common Salt*, yet will not that (no nor the most refined *Petre*) flash like to *Gun-Powder*. Secondly, where the *Cubique* or *common Salt* abounds in it (be it more, or be it less) it burns more slowly, and will certainly *Sputter* in the burning. In fine, *this* onely *Sparcles*, being flirted into the fire: the other tryall, by seeing that it is boiled high enough, *if it hang like Oile on the sides of the brasen Skummer*, is false: for if it be boiled so high, it is too *fat* to be recovered by passing the *Ashes*, and must be used as *Mothers*.

" At what time upon triall an hundred weight the of li- "quor containes about thirty five pound weight of *Petre*.--- This is often times *false*, if ever *true*: for if the *liquor* hath more or less of *common Salt*, the product of *Salt-Petre* varies accordingly. And I say, it is seldom (if ever) true, because that in *Warwick*, they seldom had two hundred weight of *Petre*, out of Nine Tunne of *raw liquor*, yet did they never boile it near to that proportion in the *copper* which would agree with his computation.

" Fill up your Tubs with any sort of wood ashes. — He forgets here the putting in of the *Mother of Salt-Petre*: of which I have spoken already. And in his prescription *of any sort of wood ashes*, there is an omission of a considerable circumstance: for those *ashes* are best which abound most in *Salt*, of which there is a great difference: I remember in *Jamaica* to have tasted the *ashes* of several woods, and found scarce

ſcarce any Salt in them; and the *Aſhes* of *oak* only the *Petre-men* term'd a *dead aſhes*: and *Chymiſts* generally obſerve that *Lignum-vitæ* yeilds little of the *fixed Salt*. If the places where the *Salt-Petre-men* do work, do not yeild them *aſhes of wood* that may ſerve their turne; they uſe then either the aſhes of *Broome* burnt as it is *green*; or (which is no *wood*!) the aſhes of *green ferne*, or *bean-ſtraw or peaſe-ſtraw*, which need not be burnt *green*; the older the better: they are better then *wood-aſhes*: Concerning the reaſon of their burning the *Broom*, and *Fern* green, I could ſuggeſt ſome remarkable obſervations, as to the different quantities of *Salt*, (and conſequently of vertues) in plants before their coming to *maturity*, or full growth; but I ſhall Satiſie my ſelf now with ſhewing the *miſtakes* and omiſſions of Mr. *Henſhaw*, whereof this is one, of which I ſhould have ſpoken (living in a place where the much uſe of the *aſhes of green Ferne*, in waſhing, gives people occaſion to obſerve the difference of *Ferne* at *ſeveral growths*, and the difference betwixt thoſe *aſhes* and *others*) but he gives me no occaſion.

Zwelfer. in Pharmacop: Auguſtan: de Sale Ligni Sancti.

All woods ſay our *Petre-men* if burned *green*, yeild a *Salter aſhes* then otherwiſe. But for *aſhes*, *the Aſh* is beſt, the young *thorne*, Second; the *Elm*, third; *Firrs* and *Fern* burnt *green* (the younger the better) yeild a *Salt-aſhes*; if dry, not ſo. Hence thoſe *aſhes* are not uſed in *bucking* of Linnen. The *Salter* tho *aſhes*, the *lighter*. If they lye *dry* a while, or till they be old they are the better for *Petre*, They gather *Saltneſs* by lying.

"Note that toward the end of your boiling, there will "ariſe great ſtore of Scumme and froth, which muſt carefully be taken off. —— He might have told us what uſe this is good for: if this *Scummë*, and the *aſhes* through which the *liquor* is percolated (*inſipid*, but impregnated with the *greaſy Oile*) be put into any convenient ground, they will generate there *Salt-Petre* in a ſhorter time, and much greater quantity then otherwiſe would be found there. Beſides, if there riſe ſuch great ſtore of *Scumme* and *Froth*, (which muſt needs vary as the *raw liquor* is more or leſs *fowle*) how ſhall any man conjecture, by weighing his *raw liquor* againſt *common water*, at the quantity of *Salt-Petre* he is to receive?

Hiſt. of the R. S Pag. 271.

"Uſually about that time it lets fall ſome *common Salt* to "the bottom which you muſt take up with the ſaid *Scum-*

Ibid.

mer. —— If there be a great quantity of *common Salt* in it, it falls almoſt all to the bottom, during the boiling: what remains of *common Salt* in it, granulates againſt the ſides as it cooles, which at *Warwick* they ſuffered to be done in the *Cauldron*, without any diſtinct *Tubb*; what an obſervation did our *Vertuoſo* looſe here concerning the diſcovery of *two ſo* different *Salts*, at firſt ſwimming and mixing *indiſcernably* in the *liquor*; and afterwards parting in this manner, the one *Chryſtallizing* whilſt the *liquor* is hot and boiling and remaining in *great quantities*: the other coagulating into *Sexangular*, not *Cubique* ſhapes, and that when it is *cold* and divided into *Shallow pannes*? Here are *Twenty pages* loſt, that might have been *Expended* in *Luciferous Experiments*.

When the liquor is ſuffered to coole in the Copper, and begins to granulate, *my artiſts* laded it out into the *ſhooting-pannes*, leaving the *turbid* and *fæculent* ſetling at the bottom: which (though Mr. *Henſhaw* omit it) they put in again to the *raw liquor*, at any time, as it boiles: and it is their Judgment, that it increaſeth the *Petre* though much of it be *common Salt*; the *liquor* yeilding a ſenſible quantity of *Petre* thereupon more then otherwiſe.

Hiſt. of the *R. S.* Pag. 272.

"When the Liquor is brought to this paſs, every hun-
"dred weight of it containeth about threeſcore and ten
"pound weight of *Petre*. —— Any one may Judge how true this is by what I have ſaid before: it may happen that half of it is *common Salt*.

"When you find the Cubique Salt to granulate and
"ſtick to the ſides. —— Why did not he diſgreſs to tell us why it granulates at the *ſides* when it *cooles*, and falls to the *bottom* when *hot*?

"Draw of your Liquor into deep wooden Traies. —— Which if you do, it is ten to one but the weight of the Liquor will break out the *ſides of them*: wherefore our men think it good Husbandry to uſe *Braſs-pannes*.

Hiſt. of the *R. S.* Pag. 273.

"That part of the Liquor which is not coagulated but
"Swims upon the *Petre*, muſt be carefully powred off,
"and being mingled with new liquors, muſt again paſs the
"aſhes, before it be boiled; elſe it will grow ſo greaſy it
"will never generate any Salt. —— This is the *Mother of Salt-Petre*, of which I ſpake before. And if it (or the *raw liquor*, being boiled too long) grow ſo *greaſy*, as not

to

to be able to *coagulate by any meanes*, what muſt we think of his deſigne to counterfeit the *Nitre* of the Ancients?

" Then caſt in by degrees a pint of the ſtrongeſt Wine-
" vinegar, or elſe four ounces of Allom beaten to powder
" (ſome chooſe burt Allom and you ſhall obſerve a black
" Scumme to riſe on the top of the liguor. —— I ſaw as good *Petre* made at *Warwick* as any in the world, without this *cautelous* refining: they caſt in nothing but good *Scowring* water, ſuch as would bear *Soap* well, and continued the pouring of it, as long as any *Scumme* would ariſe. Nor did they lade the *Liquor* out into any *Setling Tub*, (as he propoſeth) but ſuffered it to ſtand in the *Copper* till it began to *Chyſtall* againſt the ſides in ſuch manner as the *common Salt* doth *Chryſtallize* in the firſt boiling: then did they take out the liquor, leaving the *fæces* and all that is foule at the bottome. Hiſt. of the *R.S* Pag. 273.

Here I muſt take notice of an omiſſion of Mr. *Henſhaw's*, in that having brought his refined *Petre* to *chryſtall* & *rock* in the *pannes*, He then ſlightly transfers it into a Tub with an hole in the bottome to drain, and when it is dry, it is fit for uſe. But I found that our workmen took more care: For they took the large fragments of the *Nitrous rocks* and placed them in *Live-aſhes* upright, and ſo the aſhes did drain from the rocks that greaſy and *Motheriſh* ſubſtance which adheres to the *Petre* extrinſecally as it ſhootes, and which (if not ſeparated this way) vitiates the colour, and takes of ſo much from the Efficacy and goodneſs of the *Petre* as there adheres of *Greaſe*. As for the ſmaller *Chryſtalls* and *pieces*, which are too little to be ſo ranked, they are placed upon a ſheet ſpread upon the ſaid *aſhes*, and ſo that *Motheriſh* humidity draines from them, and they become clear and white as *Snow*. The aſhes being impregnated with this *Oile* are enriched in order to the generating of more *Petre*, when the liquor comes to be paſſed through them.

" The Figure of the Chryſtalls is Sexangular, and if it
" hath rightly ſhot, is fiſtulous and hollow like a Pipe. —— Hiſt. of the *R.S.* Pag. 374.

He ſhould have done well to have told us, how this *Mineral* comes to be *thus figured?* and evidenced it unto us that it was performed *Mechanically*: This had been a much more generous undertaking, then the ſuggeſtion of an impertinent conceit of his, which I ſhall ſpeak of preſently; He ſhould have ſhewed the configuration of the *particles*, what it is that gives them *Motion*; what it is that *Sizeth* them, and preſerves them *fiſtulous*: This had been a *curioſity* worthy a *Philoſopher*, that underſtands ſomething more than common *Formes*. To tell us that *nature* acts the *Geometrician*, or that it is done by the agitation of any *ſubtile Spirits*, or *matter*, acting in a determinate manner upon particles of *one configuration*, whileſt the *others* are agitated and *caſt off* by a *different Motion*: I ſay this is no ſatisfactory diſcourſe, nor very *comprehenſible*, when we reflect upon the *Liquor* of the *Salt-Petre* how thick it is *crowded*, and into what *fiſtulous Cryſtalls* it coagulates. For all this while, a man does not underſtand how *Ingenious nature* doth particularly and diſtinctly *figure* out thoſe *Cryſtalls*, nor the manner of that *Speciall Geometry* which ſhe practiſeth in this caſe. Should an *Indian* or other Ignorant perſon, ask concerning the making of a *watch*, or other piece of *Clock-work*, what was the reaſon that the hand did ſo *exactly* diſcriminate the houres; what was the reaſon of its ſo ſlow and equable motion

This diſcourſe concerning the figures of *Nitre Cryſtallized* proceeds upon the ſuppoſition that the Cryſtalls are of *that ſhape*, which is a thing I never yet ſaw, at the making of *Salt-Petre*, nor *Glauber de Signat Sal*: nor I believe Mr. *Henſhaw*. The ſhapes of the *Cryſtalls* are very *irregular*. I found none *fiſtulous*: and the Rocks of *Petre* do not ſeem to be made up of *ſexangular* concretions at all. I have ſeen elſe-where ſome ſhaped *ſexangularly*, but not *fiſtulous*, no more did *Glauber*. I obſerved, and ſo do the *workmen*, that in the coagulation in the *pans* there is commonly ſome *protuberant concretions*, which with the Cryſtalls diſtinctly compoſing them have ſome reſemblance of a *roſe*, and were ſo called by our *Artiſts*. Why did not our *Mechanicier* take notice and Explain that? The Cryſtalls are the worſt *Petre*, and ſhoot laſt, they burn as if there were reſuſcitated *Allom* in them; they make worſe powder, and leave more *faces* upon burning; and our workmen will not allow them to be the beſt ſort of *Petre*: whether there be ſome interceptions of *Aire* and *water* incorporating with the *Nitre* in *ſhooting*; or whether there be any *reſuſcitation* of *Allom*, which makes them burn with that *Spumeous Ebullition*, let ſuch conſider as magnify Cryſtalls of *Nitre* in *Phyſick*; for my part I am ſatisfied that all *preparations* (how *laborious* and *curious* ſoever) are not *improvements*. Upon a ſolution of *Petre* in water, where the Liquor is not impregnated ſo *high*, as at the *workes*, one may ſee ſuch *Cryſtalls* as Mr. *Henſhaw* ſpeaks of, if he proceeds carefully, and (as my *workmen* ſay) I have not had leyſure to try ſince the intimation) uſe *Barbary Petre*, which is that which is uſualy ſold. But I never viſited the *works*, but I thought of a paſſage ſome where Mr. *Boyle* hath, that he could never obſerve ſuch a regularity in the *Cryſtalls* of *Nitre*, as is ſpoken of: inſomuch as he ſeems *to doubt* the *aſſertion*; if my Memory deceive me not. But that ſometimes it happens, is certain; and that there are alwaies *beautifull figures* and *complications* above *Mechaniſme*.

bearing

bearing ſuch an unerring correſpondence with that great revolution of the Sun? and ſhould any man anſwer that it was a peculiar conformation of parts (which conſiſt of ſeveral mettalls) differently ſhaped, and placed in order to the compoſing of that *machine*, which the ingenious *Artiſt* had atchieved: though this anſwer carry much of truth in it, yet doth it not ſolve the *doubt*, or ſatisfie a ſpeculative *inquirer*: Nor if he continue his queſtion further, will he be ſatisfied with a narration that thoſe very materialls are apparently *Sand*, *Lead*, *Steel*, *Iron*, *Braſs*, *&c.* differently agitated according to determinate *rules* of *motion*, whereby it happens that it keeps ſo *certain* and *conſtant* a courſe, in declaring of *Time*. This kind of *general knowledge* may content ſuch as have not leiſure to engage in more *accurate Theories*; but he deſerves not the name of a *Mechanick Philoſopher*, who doth not perſpicuouſly declare the *matter*, and *configuration* of each part, the *Size* and *Uſe* of each *Wheel*, the effect of each *Spring* and *weight*, and this either *Mathematically* to the underſtanding, or by *ocular demonſtration* to the Eye. This had been an undertaking that would have ennobled Mr. *Henſhaw*, had he gone through with it: and if *he* and *his fellows* deſpair of bringing things to *this perſpicuity*, they had as good ſuffer us to be content, with our old *Formes*, and combinations of *Elements*, with which the world hath ſubſiſted ſo long, and *Mechanicall ingenuity* been ſo farr advanced, that whoſoever is acquainted with the *delicious Luxury* of *Aſia*, *Greece*, and *Rome*, will eaſily think all *our performances*, nay, *pretenſes* not to equall their *reall Enjoyments*; and if there be any *one thing* in the improvement whereof our preſent *Artiſts* (I muſt not ſay *Philoſophers*; the Inventions we boaſt of, being not theirs, but the diſcoveries of more *common and thick Skulls*) Glory, it is overballanced by the multitude of excellent things in which *they* ſurpaſſed *us*.

Mr *Henſhaw* declines all theſe Speculations, to acquaint us with ſome other that he hath of this *Salt*, "Which "if he could clearly make out, would lead us into the "knowledg of many noble ſecrets in nature; as alſo to Ibid.

"a great improvement in the Art of making *Salt-petre*.—
I am ſo great a well-wiſher to the *publick good*, that I ſhall
be willing to enquire into any thing, that may advance ſo
great & *Staple a commodity* as *Salt-Petre* is, and alwaies wil be
as long as the uſe of *Guns* continues: and ſince it is the moſt
plauſible pretenſe for the eſtabliſhment of the *Royall Society*,
that they *may* and *will* meliorate and *improve* the *Manu-
factures* and *trading* of our *Nation*, let us with ſome heedful-
neſs obſerve this *publick Eſſay* and tryall of their *Skill* and
Utility.

Hiſt. of the R. S Page. 275.

"Firſt then you are to obſerve, that though *Petre* go all
"away in *Gun-powder* yet if you fulminate it in a *Crucible*,
"and burn of the *volatile* part with powder of *Coal*, *Brim-
"ſtone*, *Antimony* or *Meal*, there will remain a *Salt*, and yet ſo
"fixed (very unlike *common-Salt*) that it will endure the
"force of almoſt the ſtrongeſt Fire you can give it; which
"being diſſolved into water and *Spirit of Nitre* dropped
"into it, till it give over hiſſing (which is the ſame with
"the *volatile* part that was ſeperated from it in the fulmi-
"nation) it will be again reduced to Cryſtalls of *Petre*, as
"it was at firſt.

This *Curioſity* was the Invention of that Honourable perſonage Mr. *Robert Boyle*, & a treatiſe writ upon the ſubject, which he was pleaſed to impart unto *me* long before *Glauber* writ any thing of that nature, and I tranſlated it into *Latine*: It hath been made uſe of by Dr. *Willis* as an inſtance whereby to ſhew that *Chymicall* Fires do not generate *new ſubſtances*, but only divide aſunder the firſt *conſtitutive* parts, and exhibit them. *Angelus Sala* did reproduce *Vitriol* out of the parts which he had ſeparated *Chymically*, by remixing them together. But neither do theſe *few inſtances* in the behalf of the *Chymiſts* out of Materialls of a *Slight texture*, ſerve to any other purpoſe then to make us *more doubfull*, not *more intelligent*: For there are ſo many *demonſtrations*, that thoſe *furnaces* do generate *new* ſubſtances & that according to the *different* regimen of the *Fire*, and the *difference* of *it*, (being *open* or *cloſe*) and the *different Veſſels* and the *different proceſſes*: it being alſo evident that by *other meanes*

De fermint. c. 3.

Anatom. Vitrioli tract. 1. c. 18.

quite

quite *discrepant parts* are disclosed, than what those *vexatious Fires* could ever reveal. that I think it impossible for any to submit his Judgment to such *Convictions*: And that the observations which Mr. *Boyle* raised from that Experiment were of such *importance* as Mr. *Henshaw* thinks, is a point which such as measure *speculations* by their *Utility*, will hardly grant.

"First you are to observe that though *Petre* go all away "in *Gun-powder*, yet if you fulminate it in a Crucible, and "burn off the volatile part with powder of Coal.—— "There will remain a *Salt*, and yet so "fixed, that it will endure the force "of almost the strongest fire &c.— This same to me doth not seem so extraordinary *aphænomenon*, so as to merit an *unusuall* regard: for that *Gold* is as *fixed* a body as this *Salt*, is undeniable; and yet in the deflagration of *Aurum fulminans*, its particles *flye away*, though they may be catched under the forme of a *purple powder*, if the fulmination be performed in a close Vessell, as Dr. *Willis* observes, *De fermentat. c.* 10. so in *Salt Armoniac*,, the common *Salt* will undergo many *sublimations*, without deserting the *concrete*: and yet it is an easy thing to reduce it to such a state of *fixednes's* as amazeth our *Virtuoso*. Many other instances might be alledged: and therefore I proceed to tell the world, that though Mr. *Henshaw* entitle Mr. *Boyle* to this *Noble Experiment*, yet what he repeats of it, is taken from *Glauber* out of a book of his printed in 1659. *de signaturâ Salium* &c. —— *pag.* 28. whom yet *he* names not. This is manifest from this that Mr. *Boyle* useth *live pieces of coal* to calcine the *Nitre* with: *Glauber* in his *Pharmacop: Spagyric. part.* 2. *p.* 28 & Mr. *Henshaw* cast in the *powder of coal*. Mr. *Boyle* Speaks nothing of calcining it with *Brimstone*, or *Antimony*, which *Glauber* doth: and so doth Dr. *Willis*: But the former prescribes the *Regulus Antimonij Stellatus* Concerning the Experiment as it is performed with *coale*, I have this Scruple; That I am not satisfied by any observations

In this reproduction of *Petre*, it is observable which *Glauber* suggests: viz. that though the *acid* and *alcalisate Salts* mortify *Each* other presently; *non tamen e vestigio fit Sal Hermaphroditicus, sed necesse est ut aliquamdiu in aere collocati vitam et naturam ardentem quâ ignis ipsos nudavit, recipiant. Hæc illis inicamus qui sales sine astris opera, animari posse forsan opinarentur. Prosp. Germ. par.* I *Pag.* 101.

determent. c. 10.

I can make, that *Salt-Petre*, if it be rightly *purified*, will upon *deflagration* leave any *such Salt* behind it at all. But that whereſoever any ſuch thing remaines, it is the product of a *common Salt*, and other *heterogeneous* mixtures incorporated with the *Petre*: I am moved to this doubt, by the ſaying of *Scaliger* concerning the beſt ſort of *Nitre* which he terms *Sal-Petræ*: viz. *Tam enim Sal quam Nitrum ita uritur, ut cineris quippiam relinquatur: Sal-Petræ univerſum abſumitur ab igni.* And in the tryalls of *Salt-Petre* which are made by the beſt Artiſts *Pitro Sardi* & *Caſimirus Semienowicz*, it is required of good *Salt-Petre*, that it burn *all away* upon the Table, leaving no *impurity* or *fœculency* behind. I have taken of the beſt *Salt-Petre* at *Warwick* oftentimes to make this Eſſay, and alſo to compare the *Cryſtalls*, and *White-rock-nitre*: I put the pieces upon a broad *Pit-coal* red-hot, and could ſee a *difference* in the burning of *Each*; and a *different* quantity of that *incombuſtible* matter remain according to the different purifications; inſomuch that as farr as my Eye could guide my Judgment, out of an *ounce* of the beſt *Rock-Petre* there could not remain *half a dram* if a *ſcruple* of that *fixed Salt* which Mr. *Henſhaw* ſpeaks of. In the *Crucible* indeed upon burning with *coal* there did remain about a *third part*, when I burnd the beſt *Petre*: and more, according as it is more *impure*. * Dr. *Jorden* obſerves that the difference betwixt *Salt-Petre* and the *Ancient Nitre*, appears in this, that a pound of *Nitre* being *burn'd*, will leave four ounces of Aſhes; *Salt-Petre* wil leave *None*. † And the common aſſertion of our *Engliſh* Gunners about the *Goodneſs* of *Petre*, is, If it be laid on a board, and a coal put to it, and it burne into the board, and leave *nothing* but a black colour, and riſe with a long flamed ventoſity and exhalation, it is well refin'd. But ſince the obſervations of *Scaliger*, & thoſe other *Artiſts* of unqueſtionable credit, and my own *Experience* teach me that the quantity

De ſubtil. exercit. 104. 15.

See the proof of this in the account of *Pietro Sardi* which followes.

If the coal be not broad the *Petre* as it burns will run over it.

Mr. *Thibaut* in his Art of Chymiſtry obſerves, that a ſpoonfull of *Nitre* caſt into a pot red-hot, will preſently be in a flame and vaniſh *all* away in Smoak Pag. 58. See him alſo Pag. 53. Where he prepares *Salt of Tartar*. So *Glauber*. *Nitrum pruinæ ardenti impoſitum totum conflagrat et in auras Evaneſcit. Pharmac. Spag, p. 2. p. 95.*

* Dr. *Ed: Jorden* of naturall Bathes. c. 7. pag. 35. *edit. in* 40.

† *Jo: Roberts* in his compleat Canonier, pag. 49.

tity of what remaines after the deflagration of *Nitre* depends upon its *impure* and *Saline mixtures*, and that pure *Nitre* burnt *openly* leaves *nothing* behind it; I am apt to believe that either there is something in the nature of the *Crucible*, or in the manner of burning *in it* in those Vessells, that causeth that *Phænomenon*. And perhaps there is not so much of untruth (*upon this ground*) in that saying of *Beguinus*, that *he that operates well shall draw a pound of Spirit from a pound of Nitre*.

Mr. *Thibaut* saith that in a *Crucible* it consumes almost quite away. pag. 34.

Tyrocin. Chym. l. 2. c. 4.

But let us suppose that there doth remain, otherwise than by *accident*, this *fixed Salt*, our *Philosopher* saith *it is very unlike common Salt*. *A doughty remarque!* It is very like any *Alcali*; if it be not *common Salt* reduced to an *Alcali*: though the mixtures of *Allom* and *Vitriol* may give it a little *diversification* sometimes. But where is the *improvement* he promised us all this while of *Manufacture* of *Salt-Petre*? Why it amounts to this! Take a pound of the best purified *Nitre* that you can buy, such as is already fit to make *Gun-powder*, distill it with three, four or five times as much potters Earth prepared in a Glass retort well luted in a close reverberatory furnace; giving fire by degrees till you come to the highest, which continue twenty four houres. Out of one pound of *Nitre* thus distilled, you may have *four ounces of Spirit* saith Mr. * *Thibaut*. But Mr. † *Hartman* upon *Crollius*, saith there will come out of those *red Spirits*, but *an ounce and an half* or *two ounces* at most. Having gained this *Spirit*, let him take a pound more of as good *Petre* and burn it with a *Coal* in a *Crucible* according to the process of Mr. *Boyle*, or *Glauber*: and let him get as much *fixed Salt as he can*: breaking his *Crucible* into the bargain. I find that Mr. *Boyle* in his account of the redintegartion of *Nitre* saith not what quantity of *fixed Salt* he had: only that he reproduced the *Petre* by pouring the *Spirit* upon the *Alcali*; and that he did not affuse *so much* of *Spirit* upon *it*, as the *Alcali* seemed to have lost in the *burning*: and yet *not much less*. In another place about *subordinate formes* pag. 350 he saith that *Nitre* upon calcination leaves only a *third part*, or *perhaps more*. But let him get *what he can* (I assure him that the fowler his

* Art of Chymistry. pag. 33.

† *De Spirit. Sal. Nitri pag.* 133.

See Mr. *Boyle*'s Experiment About the parts of *Nitre* Sect. 4.

Petre is, the more he will get) and having dissolved it in *raine-water*, and filtrated it, let him powre upon it the *Spirit of Nitre* drop by drop untill the abullition cease: Then let him with patience expect forsome daies, the redintegration of the *Nitre*: or if he be hasty, let him evaporate the liquor away till it come to a cuticle, then place it in a cool place, and in one night he shall find his *Petre* to *Crystallize*: Then powre off the *liquor*, and evaporate it to a *Cuticle* again, and so a third time till he have gotten all the *Petre*. Having allowed this *Experiment* all the advantages imaginable, which is, that our *Operatour* shall have such a quantity of *fixed Salt* as will *redintegrate exactly his Petre* (which may *not happen*, as I have demonstrated) so that having *calcined one pound*: and *distilled another into Spirit* he hath *reproduced* now one *compleat pound of Petre*: And that this *Petre* is as effectuall for *Gunpowder*, as our *common Salt-Petre*: (which yet is an *Experiment* our *Inventors* and *Improvers* give no account of: Mr, *Boyle* saith his was *more acid*, then *Salt-Petre* is usually; and what alteration that *Superfluous Spirit* adhering is to the Crystalls may produce, I know not. *Glauber* proceeds to *dissolve again and filtrate* his regenerate *Nitre*: and then saith *Quicquid post operationem Superfuerit in arenâ per evaporationem, donec cuticula appareat, rursus distillandum, et in frigore in Crystallos redigendum est, quæ*, ut vulgaris Sal-Petre *in usum adhiberi possunt*. And saith that if you will again *calcine one part*, and *distill another*, and *reproduce Petre*, you shall have more pure *Petre* than ever, and which will perform admirable effects in *Physick and Alchymistry*.) Granting, I say, our *Operator* all this happiness, I desire to know where is the *great improvement in the Art of making Salt-Petre?* How much *Cheaper* will this be *afforded*, then that which is *usually sold?* How much more *Effectuall* will the *powder* be which is to be made out of it? Will a *Thimble-full* serve to charge a *Culverin*? Or, if there be requisite as much to the *charge* as of *common powder*: will the *force* be such that Each *Bullet* of a *Culverin*, or *Canon* shall do execution at the *Texel*, *Algiers* or *Candia?* Can you dispatch with a *pocket-pistoll* from *Arundell house* the boldest *pyrate* within

Glauber de sig. nat. Sal. p. 28. 29.

ubi supra Sect. 17.

Designate. Sal. ubi supra.

within the *Straights*? Or, in fine, will this *Powder* laſt *for ever* without any *decay*, and by its *durableneſs* countervaile the charge and Extraordinary trouble in the making? I cannot find a word of *all this*; nor any thing but what will convince any man that to make *Salt-Petre*, is but to *looſe his time* inſtead of *improving the Manufacture*. I heard that *Some of the Society* had a great mind to work *Silk* into *Hats*: which project though the *Hatters* laughed at, yet to ſatisfie *them*, tryalll was made: and for *twenty ſhillings* they had a *Hat* made but it proved ſo bad, that any one might have bought a *better* for *Eighteen pence*. I ſhall do Mr. *Henſhaw* a courteſy, and tell people (beſides the pretty curioſities obſerved by Mr. *Boyle*) that with all this *trouble*, and *coſt*, though they got never the better *Petre*, yet *Glauber* tells you, this is the only way for any man to ſee the true *ſignature* and *rightly-ſhaped cryſtalls of Nitre*: they will be all as white as Snow, long, ſlender, *Sexangular*, and ſo ſmooth that nothing can ſeeme more poliſhed; and ſo diſcover that *ſignature* which God and Nature endowed *Salt-Petre* with. *Si rectè operatus fueris, omnes Cryſtalli nullis exceptis erunt in longitudinem æqualem directæ, et Sexangulæ ſine ullâ aſperitate et Scabritie, quæ vera et genuina Salispetræ rectè et probè purgati Signatura exiſtit.* And is not this a conſiderable *improvement in the Art of making Salt-Petre*, to produce ſuch *beautifull Cryſtalls*, to ſhew the true *figure* into which that *Salt* naturally doth *Cryſtallize*? Some have repreſented the *naturall figure* of that *Salt* to be *Cylindricall*: and I have by me ſome *exact* and *large Cylinders* into which it did *Cryſtallize*, but not from the *Salt-Petre works*: ſome have aſcribed to it other ſhapes; Mr. *Boyle* found it to be *Sexangular*, but the *ſides* not of equall breadth, and, each two whereof as they were oppoſite to each other, ſeemed paralell. *Glauber* ſaith that their ſhape will be ſuch as I have deſcribed in *Engliſh* above, if you follow *his way* in making them. And is not this a *notable diſcovery* for ſuch men as raiſe their Glory upon the *ſhewing of Sights*! Eſpecially, if Mr. *Henſhaw* Exhibit them alſo *fiſtulous*! which neither *Glauber* nor Mr. *Boyle* did!

de ſignate. Sal. Pag. 29 30.

Experiment of *Nitre Sect.* 5.

The other way of burning *Salt-Petre* to an *Alcali* with *Brimſtone* is ridiculous, and ſuch as any man that ever made *Sal prunellæ* will laugh at. For the *Brimſtone* doth not burn the *Nitre* to any *Alcaly* at all, nor inflames it at all, but ſerves to purifie it by conſuming the *Sal-Armoniacall* parts or *greaſy heterogeneities*, and precipitating its *fæces* to the bottom of the pots till it become ſo tranſparent, that after thoſe projections, and flagrations you may ſee the bottom of the pot though the melted *Nitre*. And this is ſo evident a thing that *Senertus* and Monſieur *Thibaut* are poſitive therein. *Pietro Sardi* (as you may ſee hereafter) and *Caſimirus Semienowicz* in his *Ars mag. Artiller. p.* 1. *l.* 2. *c.* 3. do preſcribe this very way of burning it with *Sulphur*, inſtead of the more tedious *refining* which is uſually practiſed, in order to the making of *Gun-powder*. "*Imponatur Sal-nitri in* "*vas aliquod cupreum vel ferreum, aut fictile vitreatum, et* "*igne vaſi ſuppoſito, perq; ſolitos gradus aucto exuratur, donec* "*Sal liqueſiat et fervendo bulliat. Iam ſumatur aliquantu-* "*lum Sulphuris communis ſubtiliſſimè pulveriſati, et Salinitri* "*liquefacto ſuperinſpergatur: et concipiet ſubitò flammam, et quic-* "*quid pinguedinis vel noxij terreſtris Salis non ſufficienter pur-* "*gatus Sal-Nitri habuerit, exuret et multum clarificabit: in-* "*jectio autem Sulphuris aliquoties reiterari poterit. Deniq; li-* "*quefactum et purificatum Salemnitri Effundito in marmor poli-* "*tum vel laminas ferreas aut cupreas, vel vaſcula aliqua* "*metallica vel ſigulnea vitreata, et frigeſcere ibidem ſinito. Ha-* "*bebis jam Salemnitri congelatum, Parium lapidem vel Alaba-* "*ſtritem colore et duritie quàm proximè referentem.* If that excellent *Lithuanian* found this to be as good a way to *refine* the *Nitre*, as that other by new ſolution, affuſion of *Lixiviated* liquors, and new coagulation: If it be evident that *Sal prunellæ* will *Cryſtalize*, and *burn* as other *Petre*: if it be certain that *Brimſtone* cannot burn *Salt-Petre* (as *Senertus*, *Tartaglia* and *Semienowicz* avow) How ſhall we do for this *fixed Salt* or *Alcali* wherewith to make *Nitre* by affuſion of the *Spirit*?

*Senert. de conſ. Chym. c.*19. *Mr.* Thibaut *Pag.* 59.

His calcining of it with *Antimony* hath as little of ſence as the former: for beſides that there is more trouble in the proceſs

proceſs, becauſe that the *Alcaliſate Salt* muſt be waſhed from the *Antimony*: which takes off from the *improvement*. If there be any *Alcali* in thoſe preparations of *Diaphoretick Antimony* (wherein every Apothecary tries the Experiment) it is from the *common* or other *Salts* mixed with the *Nitre*, and not from the *Nitre*, part of which flies away with the *Sulphur* of *Antimony* as it *deflagrates*: the reſt ſtaies behind, and may be extracted with water, and *reduced* into *Cryſtalls* of *Nitre*, as a friend of mine tried, of which he keeps ſome by him. This *Schroder* and *Rolfincius* ſpeaking of *Diaphoretick Antimony*, and its edulcoration confeſs, "*Aqua poſt primam* "*edulcorationem nitro gravida ad medietatem evaporata præbet* "*egregiam Aquam Anodynam. Eâdem juſtâ evaporatione prægreſſâ* "*in cellâ ſubterraneâ locata concreſcit in Cryſtallos, qui Nitrum* "*Anodinum vocatur. A Schrodero* LAPIS PRUNEL- "LÆ ANTIMONIALIS *indigitatur*.

Ralfine c. Chym. in art. red act. l. 5. Sect. 7. c. 2. pag. 377.

The *vanity* of *Some men* not knowing when they are *well* muſt be trying *new concluſions* although it be for the *worſe*: and obtruding *them* upon others. What (if at all,) was to be done with plain *coal*, muſt for *Oſtentation-ſake*, be tryed with *Brimſtone* and *Antimony*. And it had been a more genuine obſervation to have acquainted the world how; after Mr. *Boyl* had found out a way to reproduce *Nitre* by affuſing the *Spirit* to the *Alcali* of *Nitre* burnt with *coal*: Mr. *Henſhaw* had found out a method how to reduce the *Alcali* of *Nitre* burnt with *Brimſtone* and *Antimony* to *Nitre* without any new *Spirit* affuſed. Had he pretended this, it had been but an *ingenious impoſture* for vulgar capacities: but now there is more of *weakneſs* than of *knavery* in the *performance*.

Had he told us out of Mr. *Boyle's* Eſſay, and eſpecially out of *Glauber*, that the manufacture of *Salt-Petre* might be *improved* by affunding *Aqua Fortis* or the *Spirit of Nitre* upon the ſolution of *Pot-aſhes*, or any *Alcaliſate-Salt*; Nay upon *Sal Gemmæ*, *Bay-Salt*, common table Salt, or *Lyme water*, and that thereby any one might gaine *Cryſtalls* of *Nitre*, proceeding according to *Glauber*. *Proſper: German. part. 2. pag. 66. Et habebis purum putum Salempetræ, inſtar alius Salis-*

Petræ ex pecorum aut pecudum Stabulis petiti, flammam concipientem. If he had hold us this, though the advantage would have been greater than by the *Alcali* of *Nitre*; yet would it not have been considerable, because of the *expense* and *Trouble*, and that it must be performed with the *brittle* materialls of *Glasses*, as *Glauber* observes. But it would have illustrated a little what I mentioned about the *Lixiviate Salt* in the Ashes through which the *Salt-Petre-liquor* is filtrated, shewing how the *Alcali* and *common Salt* are turned into *Petre* by vertue of that *Liquor*, which yet hath nothing of the *Acid Spirit*, whereby the *Chymists* generate theirs. Let us learn from thence how obscure the procedures of Nature are! and how different from those of *Art!* And let us leave off to say, that things are alwaies *generated* of those *principles* into which they are *Analised*.

ibid *pag.* 65.

"That which I aim at then is, that if the *Spirit of the volatile Salt of Soot*, or of the *Urine*, *blood*, *hoofes*, *hair*, *excrements* or indeed any part of *Animals* (for all abound with such a *volatile Salt fixed* and *Oile*, as *Petre* doth) could by the *same way*, or any like it, be reduced to *Petre* or some *Nitrous Salt*, not much differing it from it: it would excellently make out a *Theory* that I am much delighted with *till I am convinced in it*; which is, that the *Salt* which is found in *vegetables* and *Animals*, is but the *Nitre* which is so universally diffused through all the *Elements* (and must therefore make a *chief ingredient* in their *nutriment*, and by consequence of their *Generation*) a *little altered from its first complexion*. And that the reason why *Animals* that feed on *Vegetables* are obliged by nature, to *longer meales*, than those that feed on other *Animals*; is, because *Animals* are fuller of that *Salt* then *Vegetables*: And indeed such *Animals* are but *Caterers* of it for Man; and others whom natures bounty gratifies with a more *delicious* and *lusty Dyet*.

Hist. of the R. S. Pag. 275. 276.

"I confess I have been the more confirmed in this *fancy*, since I have often seen a friend of mine with a natural and facile'ε χεῖρα convert the greater part of *Petre* into a

Salt

" *Salt* ſo like the *volatile Salt of Urine*, that they are ſcarcely " to be diſtinguiſht in ſmell or taſt; and yet he adds no- " thing to it that can poſſibly be ſuſpected to participate of " that nature. But indeed all *volatile Salts* are ſo *alike*, that " it is not eaſy to diſtinguiſh them in any reſpect.

I have been carefull not to diſmember this laſt *Paragraph*, that the *Reader* might with one view ſurvey this *ſtrange fancy*: and Judge better how little I impoſe upon him in the ſequell of my diſcourſe.

And firſt I ask our *Orator*—how he applies this *Speculation* to what he promiſed us in the introduction to it? *How does this improve the Art of making Salt-Petre*? If an *ill Memory*, and a proportionate *mixture of ſomething elſe*, be demonſtrations of a *great Witt*, no man hath given greater teſtimonies of *his abilities* than Mr. *Henſhaw*. Secondly, I demand why *He* is ſo Solicitous *to transform the Spirit of the volatile Salt of Soot* or *Urine* &c *into Petre*: whereas any man that conſidered what he went about would employ his care rather to coagulate the *volatile Salt with which the Spirit of Soot and Urine abounds* with *Spirit of Nitre*, *Aqua-fortis* or the like into *Petre*; or ſome ſuch *Nitrous Salt*? But, behold the *Happineſs* of Mr. *Henſhawe's* Fanſy and the *unhappineſs* of his *judgment*: That which he Fanſied poſſible about the coagulation of the *volatile Salt* abounding in Spirit of *Urine* with *Spirit* of *Nitre* into a kind of *Petre*, this Experiment hath happily ſucceeded under the tryall of the Honourable and inquiſitive Mr. *Boyle*: but yet that *Theory* which he goes about to deduce thence is as farr from being eſtabliſhed thereby, as the Artifice of *Salt Petre-making is* from being thereby *advanced! From Spirit of Urine* (ſaith Mr. *R. B.*) *and Spirit of Nitre, when I have ſuffered them to remain long together before coagulation, and freed the mixture from the Superfluous moiſture very ſlowly, I have ſometimes obtained fine long Cryſtalls, ſo ſhaped, that moſt beholders took them for Cryſtalls of Salt-Petre.* But whoſoever ſhal conſider how much more *trouble* and *coſt* there is in diſtilling thoſe other *volatile Spirits* than there is in the drawing of the *Spirit of Nitre*: and how *ſmall quantities* are like to be made this way,

Mr. *R. B.* in *Origine of formes* Pag. 125.

and thoſe perhaps not ſerviceable in *Gun-powder*, will eaſily ſee that this project is as *inutile* as the former was in order to the *improvement of the making Salt-Petre.*

Oh! But *it will excellently make out a Theory, that the Salt which is found in vegetables and Animals, is but the Nitre which is ſo univerſally diffuſed through all the Elements, a little altered from its firſt complexion.* I remember that *Scaliger* taking occaſion to complain of *Cardan* for ſome *illogicall* inferences, uſeth theſe words: *Dij benefecerunt, quòd te fæminam non fecerunt. Ad primam quamq; ſpeciem promiſſorum exiluiſſes.* I muſt apply this *Sarcaſme* to Mr. *Henſhaw*, who could be deluded by ſuch weak appearances of *reaſon.* Let us but ſhape an *Hypotheticall Syllogiſme* for him, and conſider the conſequence.

De ſubtil. Exerc. 153 Sect. 9.

If the Spirit of Nitre *being poured upon the* Spirit of the Volatile Salt of Urine, Soot &c. *doth reduce the Volatile Salt to* Petre *or ſome* Nitrous Salt *not much differing from it; then doth it follow that the* Salt *which is found in* Vegetables *and* Animalls, *is but the* Nitre, *which is ſo Univerſally diffuſed through all Elements* (*and muſt therefore make a chiefe ingredient in their nutrition and generation*) *a* little altered *from its firſt complexion.* *But the* Antecedent *is true* Ergo,

In the firſt place it is evident by the Experiment of Mr. *Boyle*, that even *Sea-Salt* by the affuſion of *Spirit of Nitre* may be turned into *Petre.* Nay *Glauber* teacheth us how *Allom, Vitriol, Mineralls* and *Stones* may be with more or leſs trouble converted into *Nitre*; why did not he extend his conſideration about the *Nitre in all the Elements*, to them? Is it becauſe that they abound not in *Oile* and *volatile Salt*, upon which he *ſo wiſely* builds his *Argument?*

Origine of Formes Pag. 216.

Secondly ſince it is made evident by *Glauber* in many places of hisworks, that the *Spirit* of *Nitre* is as it were the *Seed* of *Nitre* by which it propagates it ſelf and aſſumes a body, as plants do, where it finds one agreeable: and ſuch are not

In Append. ad quint. part. Proſper. German. Pag. 20. 23, 25, 49. &c.

only

only (nay not *principally* : which he ſhould have noted) the votatile but fixed Salts of any Creature? *Aqua fortis, aut Spiritus Nitri, eſt quaſi Semen Salis-Petræ, atq; hanc naturam habet, quando alijs Salibus, ſicut ſemen aliquod vegetabile terræ, mandatur, ut ex ipſis augmentum capiendo, multiplicetur, quemadmodum herbarum ſemina faciunt.* This *Seminall principle* in *Nitre* ſeemes to have the approbation of Mr. *Boyle* : and if it be thus, as undoubtedly it is, and that thoſe *Salts* (whither *volatile* or *fixed*) are but the *materiall* principle, I do not ſee any more validity in the conſequence, than if I ſhould ſay, becauſe ſundry *plants* grow in the *Earth* or *Water*, therefore the *Earth* or *Water* were but thoſe plants *a little diſguiſed in their complexion.* *Chymiſta Scepticus, p. 240.*

In fine, it is ſo farr from following hereupon, that *Salt-Petre diſguiſed is the Chief ingredient of the nutrition and generation of Animals* ; that it doth not follow, that *it is any ingredient at all* ; but that there is ſomething in thoſe ſubſtances mentioned that may be converted into *Petre*, and is, as an *Ariſtotelian* would ſay, diſpoſed fitly to be the *Subject matter* of that *Forme*. For as this *Argument* is *ſhaped*, what I ſay is as manifeſt, as that the *conſtitutive parts* of the *Nitre*, are to be the *volatile Salt* & the *Spirit of Nitre*: The one thing *indifferent* to ſundry *combinations* and *tranſmutations*, and which hath nothing of the nature of *Salt-Petre* ; but is palpably tranſmuted ; ſince in the diſtillation of good *Nitre* there appears no ſuch thing as *volatile Salt* : The other it is, that *Specificates* the *prediſpoſed matter* , and generates *Petre* out of it ; ſo much altering the *complexion*, that the *affinity* betwixt that volatile *Salt* and *Salt-Petre* is no more than betwixt a *man* and a *pumpion*. He talks of the complexion of the *Nitre* being a *little altered* : but I would faine know *how little that is*. Let me ſee the like Cryſtalls : *a reſembling flame*, and other effects that reſult from the *being* and *Specification* of *Salt-Petre*. If *Salt-petre* be a *chief ingredient in the generation and nutrition of vegetables* , Tis either becauſe of its *bulke* or *Efficacy* that it is *chief* ; but neither of theſe is true : For the *quantity* is not ſo great in *vegetables* or *Animalls*, ſhould we allow the *volatile Salt* and *Nitre* to be *all*

one. Not for *Efficacy*, becauſe it is not made out that there is *Nitre* in the *Sea*, in *clay-grounds* or *Springs*, or in *Countries remote from the Sun*, yet here *fiſhes* and other *Creatures* feed, and *plants* grow: and conſequently that cannot be a *chief ingredient in nutrition*, which may be wanting.

There is ſomething elſe in Mr *Henſhaw* that lookes like an Argument by the introduction *FOR.* —— *For all abound with ſuch a volatile Salt fixed, and Oil, as Petre doth.* I cannot tell how to forme this Argument, and yet convince the world that I do not injure him, this paſſage is ſo extreamly *ridiculous.* Yet I will endeavour it, if it be but to ſhew the *Logick* of *Ant'-Ariſtotelians*, and how much we owe to that *providence* which hath *educated* us better than to argue ſo. The propoſition he *aimes at*, and would prove is, *That the Salt which is in vegetables, and Animals, is but the Nitre which is univerſally diffuſed through the Elements.* The *medium* or Argument by which he would prove it is —— is —— is —— harder to be *found out* than the meaning of *Ariſtotle* in his *Acromaticks*. Let us conſider it again.

"That which I aim at then is, That if the Spirit of the "volatile Salt of Soot, or of the Urin, blood, hornes, hoofes, "haire, excrements, or indeed any part of Animals (for "all abound with ſuch a volatile Salt fixed, and Oile as "*Petre* doth) could by the ſame way (viz: as the redinte-"grated *Nitre*) be reduced to *Petre*, or ſome *Nitrous* Salt, "it would Excellently make out a *Theory* that I am much "delighted with, till I am convinced in it: which is, that "the Salt which is found in vegetables and Animals, is but "the *Nitre* which is ſo univerſally diffuſed through all the "Elements (and muſt therefore make a chief ingredient in "their nutrition, and by conſequence of their generation) "a little altered from its firſt complexion.

Here is the *Spirit of the volatile Salt* of the parts of *vegetables* and *Animals*, to be coagulated and transformed into *Petre* by the Spirit of *Nitre.* —— Here is a *volatile Salt fixed*, and *Oile* ſuch as is in *Petre!* mentioned to what

By his Favour there is no conſequence in that paſſage: if it be the *chief ingredient in nutrition*, 'tis ſo *in generation*: for though *nutrition* be *commonly* by a new *generation* of parts: yet in that which is properly generation, the *Seminall principles* and *active* are *chief* in *nutrition*; the *materiall* and *paſſive* principles are more regarded.

purpoſe

purpoſe! —— Here is a *Salt* ſpoken of to be found in *Vegetables*, and *Animals*: yet 'tis not expreſſed whether it be the *volatile* or *fixed Salt*: yet theſe *two* are different, and thoſe that abound with *volatile Salt* are more the *Phyſick*, than the *food* of man. —— Well I have ſpent half an hour to frame a *Sorites*, or any *tolerable Argument* out of *theſe words*: but I cannot do it: but I will adventure to give *our Philoſophers* this adviſe that they would take our *Engliſh* word *FOR* into their ſerious conſideration, and *aboliſh the uſe of it*, as the *French* Academy at *Paris* did *Car*. Before I have done with this *Hiſtory*, I ſhall ſhew that this *Intimation* was but *neceſſary* for *them*.

To proceed: How doth it appear that *Salt-Petre* abounds with a *volatile Salt fixed* and *Oile*? In the regenerated *Nitre* (which *Glauber* makes to be the beſt) there is nothing but *Alcali* and the *Spirit of Nitre*: in the *Nitre* which is generated by the mixture of the *Spirit* of *Urin* and *Spirit of Nitre* there is no ſuch thing. In the *diſtillation* of *Nitre* there is nothing but *Spirit* (inſeperate from *Phlegme*) and its *Alcali*: and as there is no *Oile* there, ſo I hope he would not have us take the *Alcali* for a *volatile Salt fixed*. In the making of *Salt-Petre* there is found indeed ſomething that ſeems *Oily* and *greaſy*: but that is *Excrementitious*, and ſo farr from being a *conſtitutive part* of *it*, that it muſt be *Separated* from *it* (as Mr. *Henſhaw* knowes) before *Salt-Petre* can be made: and the great contrivance is *how to ſeparate it*. So *Glauber* in *Proſper German. part.* 3. *pag.* 43. *alias enim pinguedinem nimiam contrahit lixivium, nec ullum Sal generabitur.*

From the mention of this *Oile*, I muſt take an occaſion to tell the world how ſuperficially our *Virtuoſo* writes the *Hiſtory of Nitre*: I could ſuggeſt many *curioſities* from the *ſeverall liquors* in the making of *Salt-Petre*: But I have not time to diſcourſe of the *Mothers of Petre*, nor how that *greaſe* being lodged in the *aſhes*, thoſe *aſhes* being expoſed to the Sun at *Warwick* did in one or two daies produce viſible *Nitre* on the top of the *aſhes*, ſo that in few daies thoſe *aſhes* become fit to be *Elixiviated* into *raw liquors*, which were before but to make a *Lixivium* to

purge the *liquors* that had boiled. I ſhall only touch at an Experiment which may not be unwelcome to the Honourable Mr. *Boyle*. I took of the *Mothers* that had ſtood long and were exceeding *Oily* : I powred four ſpoonfulls of them into a large *Venice-glaſs*, half full of water : This *greaſy liquor* funke to the bottom *inſtantly* without altering the *taſt* or *colour* of the *water* at all : ſo that the top was *clear water* ; the bottom of a *reddiſh colour* as *bilious Urin* : only on the ſurface of the water, and in the middle, there did flote ſeveral very ſmall *bubbles* of the *colour* of *water*: having let this ſtand a day : I took a Solution of the *Alcali* of *Salt-Petre* (which, though of a *greeniſh blew*, yeilded a *lympid liquor* upon *filtration*) and poured two or three ſpoonfulls into the mixture of *Mothers* and *water* : immediately the whole liquor turn'd *Lacteous* or *White* ; but the colour *preſently* contracted it ſelf into a white *enæorema*, or *ſuſpenſum*, ſuch as is to be ſeen in *healthfull Urin*, and ſo floted above the ſurface of the *Mothers* : the next morning I found as it were a *powder* fallen to the *bottom*, which I ſtirred up to the top, whereupon the whole *liquor* up to the *top* of the water was *turbid*. * I let it ſtand all night, and this morning the whole *liquor* from *top to bottom* is of one *colour* ; and that exactly of a *Limon-colour*, or like old *Hoccomar-wine* ; on the top there ſeems to float thin *coagulations* of *fat* with ſome variety of *colours*, ſuch as one may often ſee on *ſmall waters* that ſtand in *Mooriſh* grounds : the liquor is nothing nigh ſo *acrimonious* and *purigent* as the *Mothers* were : and *all of it is* as *greaſy* as the *Mothers* were, when *Separate* : hanging on the finger, as *Oile*, and not like *water* at all ; at the bottom of the Glaſs there lies a *Yellow-ſediment* as 'twere *powder*, which upon *agitation* will not riſe of it ſelf, but muſt be ſtirred up with ſomething, and

* After the *Glaſs* had ſtood ſome daies, the liquor loſt its *Oilineſs*, no *Cryſtalls* did ſhoot at all, but it became a littile *turbid* on the top there floted ſomething here and there, like to a thin *cremor*, and on every ſide of the Glaſs from the top to the bottom thereof fixed themſelves certain *moleculæ* which a credulous *Chymiſt* would as firmly have beleived to have been the *rudiments of ſome plants*, as that the *Salt* of *Harts-hornes* in diſtillation repreſents the *hornes of Stags*; If you will imagine any Plant growing on the ſide of a *wall*, and that inſtead of the leaves of the *plant*, there were nothing but white *filaments iſſuing from a root*, ſuch were theſe : all of them were of one *bigneſs*, and were ranked in *ſome order*. A chance hindred me from making further *inquiries* : nor indeed am I ſollicitous about them.

The *Phænomenon* appears not if you look *down right* on it, but ſtanding on one ſide at a diſtance.

and then resembles the white *Hypostasis* of *Urin*, with *capillary filaments* enterveaving each other.

And, How doth it appear that *urin* doth abound with *a volatile Salt fixed*, and *Oile*? *I* do not understand what he meanes by his *volatile Salt fixed*: by what is it *fixed*? to *what degree? volatile Salts* are sometimes so *fixed*, as only to *abate*, not alter the *volatility*: *as the volatile Salt* of *vipers*, in *Zwelfer*: and the *volatile Salt* of *Harts-horn* (of which *I* keep some) with rectified *Spirit of Salt*: Sometimes *they* are so *fixed* as to loose the nature of *Salt* and to become *insipid*, and *indissoluble*: as when *volatile Salts* are mixed with *Lime-water*: There are a sort of *Salts* which *Zwelfer* calls *Salia Essentialia*, which are not to be called properly *fixed*, nor *volatile*, being *mediæ quasi naturæ inter utraq; Salia*, volatilia *Scilicet*, (*quæ instar* Spirituum *levi ignis calore concitata sublime petunt*) *et* fixa.

Zwelfer. in Phrmcop: Aug: pag. 486. Edit. in 8.

Ibid. pag. 234.

And there are *Salts* so *fixed* naturally that they will endure the *Fire* without evaporating: such are *Alcalisate Salts*, being *purely Salt fixed*: other *fixed Salts* having of *acidity* in them, and upon *distillation* yeild an *acid Spirit*: how farr these may be *volatilised*, is not the question; but whether there be in *Urina volatile Salt fixed* which any man will deny, who considers with how much ease the *volatile Salt of Urin* is procured. As for the *Oile* wherewith *Urin* is said to abound, surely Mr *Henshaw* converses with *men of a strange kidney* that make *such water*; Or that feed much upon green *Tortoyses*. *In some morbid* persons Physicians Speak of *Urines* that are *oleaginous*, ἐλαιόχροα, ἐλαιοφάνη, ἐλαιώδη. But *I* shall favour the *Virtuoso* so much as to understand what he saies about *Urin*, as relating to persons *in health*, and not *sick*; least *I* should be to seek as much for the *volatile Salt* as *I* am for the *Oile*, which is not to be distilled from it by any *Chymicall* process, that I meet with in Dr. *willis*, or any else: nor to be seen, but in such as feed on *green Turtle* in the West *Indies*: or *are not well in their bodies*: not be *spoken* of, but by such as are *not well in their Wits*. If by *Oile* he means that which gives a colour to the *Urin*, and is by Dr. *Willis* called the *Sulphureous* part of the *Urin*: I shall not now dispute

Zwelfer. in Append. pag. 99. Salia purè Salsa fixa. Salia, acidâ- Salsa fixa.

Vid. Zwelfer in Append. pag. 99.

whether that be *Oile*: or, no ſince that ſame *learned* and *inquiſitive* perſon aſſures us he found *no great quantity* of *it* in his Analyſis. *Urinæ Anatome oſtendit quod Elementa é quibus liquor eius conflatur ſunt plurimum aquæ et Salis, aliquantulum Sulphuris et terræ, atq; Spiritus tantillum.*

Willis *de urinis* c. 1.

Yet a word, or two: How doth it appear that *Nitre* is ſo *Univerſally diffuſed through all the Elements*? If he mean the *Ariſtotelian* Elements, did he ever find it ſo univerſally lodged in that *Fire*: is it ſo diffuſed through *Water*? how many *foot deep* is it found in the *Earth*? How doth it appear to be in the *Aire*? Let Mr. *Henſhaw* recollect himſelf. Let him give what *Notion* he will to his *Elements*., the Aſſertion is falſe: although it be true that in this *Terr-aqueous Globe* of ours there is *nothing* occurrs but what contains in it *Salt-Petre*, or ſomewhat that may *firſt* or *laſt*, after greater or leſſer *pains* and *time* be *Animated* into *Salt-Petre viz.* "*Exemplum hoc eſto. Sal Vegetabilium, Animalium, et Mineralium Eſſentialis vel Univerſalis ſuâ naturâ quidem nitroſus eſt, ſed prius flammam non concipit, quám ex aere* vitam *et* flammam *attraxerit. Salium autem etiam unus citius et libentius altero,* vitam illam *attrahit, prout a Naturâ formatus eſt. Quò fugaciores et magis urinoſi ſunt ſales, eo citius in* Nitrum ſe commutant: *quo mordaciores et magis corroſivi, eo difficilius et tardiùs* Salispetræ naturam induunt. *Sed quia Nitrum Sal eſt utriuſq; naturæ particeps, urinoſæ nimirum et corroſivæ, et quaſi exutroq; Sale urinoſo nempe et corroſivo compoſitus, ejus ope peritus Naturæ Salibus facile ſuccurret, et ex iis faciet quicquid voluerit. Nec Sal ullus eſt in rerum naturâ qui artis adjumento in Nitrum mutari nequeat: Inprimis vero ſales illi, qui igne ſublimantur et ejus vi elevati aſcendunt: ut illi qui in urinâ et excrementis animalium omnium ſunt:* Imo animalia, vegetabilia, et Mineralia ipſa, facile admodum Nitri naturam arripiunt. *Hic primus Salium gradus eſto. Alter gradus eſt Salium, qui aliquanto fixiores ſunt, ut artis filii nuncupant, et in igne a vegetabilibus, animalibus et mineralibus relinquuntur. Hi difficilius in Nitri naturam tranſeunt.*

Glauber. Proſper. German. part. 1. Pag. 98. 99.

It is to be noted, that although he ſay *Sea-Salt* and ſome *others* do require much time to be converted into *Petre*: he means when it is to be as it were ſowed & planted, & generated by a *Seminall fermentation*; otherwiſe, he knew, and teacheth ſpeedy waies of generating *Nitre* out of the *fixed-Salt* of *Lyme-ſtone* as doth Mr. *Boyle* out of *Bay-Salt* in his *Origine of formes pag*: 216.

Omnium

" *Omnium difficillime illi, qui in tertio gradu ſunt, ut Sal commu-*
" *nis, marinus, montanus ſeu foſſilis, alumen et vitriolum. Nam*
" *hos ars etiam eò deducit, ut in verum Nitrum abeant, ſed diffi-*
" *cilius, cum longiore ad eos mutandos tempore indigeat, quam*
" *ad ſupranominatos Sales fugaces, volatiles et urinoſos. Quare*
" *nemo eâ opinione eſto, quando in Scriptis meis dico quod hic*
" *aut ille Sal, in Salem-petræ converti queat; quamprimum lixi-*
" *vio extractus, aut ſaltem ignis calcinatione elicitus fuerit,*
" *quod Sal-petræ verus et ardens futurus ſit:* Tempus adhuc
" requiritur, quo ex aere vitam et animam, alliciat et ardens
" evadat.

Lippis et tonſoribus notum eſt, maximam Salis-petræ antehac confecti partem, ex lixivio terræ, ex ovilibus, aliarumq; beſtiarum Stabulis antiquis petitæ, excoctam fuiſſe. Quare ex antiquis jumentorum, pecudum et pecorum Stabulis, et non etiam novis? Ideo quia non ſolum vetera Stabula longo temporis progreſſu plus ex excrementis et urinâ Salis imbibunt, eâq; de cauſâ plus-Salis-Petræ conferre poſſunt. Sed etiam Sales ipſi Excrementorum ex animalibus, quod potiſſimum eſt, longo temporis progreſſu exaere animam ſuam acceperunt, quâ recentes nondum imbutiſunt. *Nam, coquat quis, torreat et vexet ſtercora, et urinam animalium, ut volucrit, Nitrum nunquam evadent, niſi ex aëre* vitam ſuam *hauſerint.*

Whereas he ſaies, " That the reaſon why Animals
" that feed on Vegetables are obliged by Nature to longer
" meales than thoſe that feed on other Animalls; is becauſe
" that Animals are fuller of that Salt than Vegetables: and
" indeed ſuch Animals are but Caterers of it for man and
" others whom nature gratifies with a more luſty and de-
" licious dyet. —— To begin with the laſt paſſage, *I* ob-ſerve that our *Inventor* hath ſuch a *Pique* againſt *Antiquity*, that he tranſgreſſeth the *old* proverbe *De guſtibus non eſt diſputandum.* It doth not appear to me *certain* that the feeding upon *Fleſh*, as moſt do now: or on *Fiſh*, as moſt did heretofore; is more *delicious* than to feed on *vegetables*, and ſome of *their productions.* Nor yet that it is the more *luſty food*, give the *word* what ſence you will. The ſtory of *Daniel's* pulſe: of St *John Baptiſt*, of the *Negro's* in the *Weſt-Indies*, of

Zacchias in quæſt. medico-legal. l. 5. Tit. 1. qu. 2.

the *Daniel. 1. v. 5.*

the *Bannyans* in the *East-Indies*. They will not grant it who hold (I think *most truely*) that *before the flood* men lived on *Vegetables*: In the *Golden age* they are not fansied to have had this *delicious* and *lusty food*.

Ovid. metamorph. l. 15.

At vetus illa ætas cui fecimus Aurea nomen
Fœtibus arboreis, et quas humus educat herbis
Fortunata fuit, nec polluit ora cruore.

How many of the *Ancient Philosophers* did *decline* & *decr* this *admired dyet*? but our *Virtuoso* will as little approve of their *Palats*, as their *judgments*. How many of the primitive *Christians* were of the same *judgment*, and liv'd *accordingly*? They were so *universally* inclined to it (I do not mention the *Tatiani* and *Encratitæ*, and other *Hereticks*) that in the Examination of such as were to be admitted into *Holy Orders* it was one Query, *Si nuptias Secundas non improbarent, et carnes non haberent Execratas. Quin cogebantur prægustare carnes, alioquin Excommunicabantur, et de ordine sui Clericatus deponebantur, ut habes expositum in Can*: 50 51. *Apostolorum*. 1 *Can*. 14. *Carthaginensi, canone primo. Bracharensi primo, et refertur de consecrati dist*. 23. *cap. qui Episcop*. The order of the *Carthusian* Monks at present eat no *Flesh*: yet doth *Arnoldus Villanovanus* demand, *Quis audet asserere quod nemo vitæ longitudinem consequatur sine carnium usu, cum in Monasteriis Cartusienses octogenarii et centenarii mundorum sensuum crebro inveniantur*. When *David* found the *Egyptian* in the field, who had eaten no bread, nor drank any water three daies and three nights: *they gave him bread and he did eat, and they made him drink water*: *And they gave him a piece of a cake of Figgs, and two clusters of Raysins*: *and when he had eaten, his Spirit came again unto him*. And it seemes as if the *general* food of the *Romans* had been *Herbs*: So *Zacchias* imagineth, *Quibus ego addam* Claudii *Edictum*, *de quo apud* Suetonium *in ejus vita* cap. 22. *quo cavebatur ne in propinis quicquam cocti væniret*, præter olera et legumina: *quæ quidem non contemnendam conjecturam præbent antiquiores*, hæc *præ cæteris cibariis in familiarissimo usu habuisse*; *Est et apud* Horatium

Renatus Mortan in anim adv. ad Schol. Salernit. pag. 590.

Arn: de villa-Nova de esu carnium pro Sustent ord. Cartusien.

1 *Sam*: 30. 11. 12.

Zacchias, quæst medico-legal. l. 5. *tit* 1. *qu.* 2.

locus

locus ex quo similis conjectura desumi potest, cum suum victum familiarem ac quotidianum narrat : l. 1. Sermon. Sat. 6.

——— ——— *Inde domum me*
Ad Porri, et Ciceris refero, Laganǫ̀ catinum.

I neither find that these people *disrelished their dyet*, or wanted of that *lustines* which the *eaters of flesh* pretend unto. That such as feed on *Vegetables* should be *Caterers of Nitre* for those that *feed upon Animals*, it is either *false*, or they are very bad *Caterers*, since they seldome do their *duty* in procuring *that Salt* : and when *by chance* they may have fed upon *any*, I am confident it is transmuted into an *Urinous Salt* in their bodies, so that *those other Animals* never get any other than that *universall Salt* which is the *radix Nitri* as *Glauber* calls it, but is really no more *Salt-Petre* than it is *Salt Armoniack*; *Salt of Wormwood*, or *Salt of Scurvy-grass*. No *complexion* was ever so altered by being *Sunburnt*, or by the *Small Pox*, as the *complexion* of *Salt-Petre* is in *Plants* and *Animals*, from what it is at the *Work-house*.

" The reason why Animals that feed on Vegetables are " obliged by Nature to longer meales than those that feed " on other Animals ; is becaus Animals are fuller of " that Salt then Vegetables. ——— This *Reason* puts me in mind of a *probleme* in *Aristotle*, Why *Colts that have seen a Wolf, are Swifter than those that have not* ? (I think it is to that purpose.) After sundry reasons given, he adds ; *' But purhaps there is no such thing.* I profes I do imagine it is so in *this Case*. And waving the question *How nature obligeth them to it* ? I never heard that those *Encratites* and such as *Daniel*, or St. *John Baptist* &c. had Stomachs and did *eat like Horses* : I never read of the *long meales* of the *Bannyans*, or *Pythagoreans*. Any planter in *Barbados*, will assure you that a pint of a kind of *bean* which they call *Bonavist* with a little Salt, boyld, will nourish and support a servant more than *flesh*. The like we observe with *Cacao in Iamaica*. The *Hunters* in *Iamaica* that live on *Flesh* and *Salt* when they are abroad in the Woods, eat much more in *quantity* than when they

Eat *bread*, *Cassavi*, or *Patata's* with their *meat*. Besides, there is a bird in *Iamaica*, and the adjacent *Islands* almost as big as a *Turkey* and like one, they call it a *Carrion Crow*, these devour all the offall of the beasts that are slain by the *Hunters*: they are never *fat*, nor *satiated*: *I* have seen some of them feed on *Carrion* from *morning to night* without any considerable *intermission*.

'That facile Ἐγχείρεσις by which his friend *did convert* "*the greatest part of Petre into a Salt so like the volatile Salt of* "*Urine that they are scarce to be distinguished by smell or taste*: "*yet adding nothing that can possibly be suspected of that nature.* If it be true, and that Mr. *Henshaw* was not *imposed* upon; if this *Nitre* was so changed as that it lost its *inflammability* and *way of burning*, its way of *Crystallising* and those other *qualities* which are *proper to Nitre*: how *facile* soever the *Operation* were, it was a *transmutation*, and the *change* was greater than when the *Complexion of Salt-Petre is only altered a little*.

I am tyred with multiplying reflexions upon such a discourse: any one will apprehend that this *great* and *usefull Speculation* of Mr. *Henshaw*'s amounts to no more than *wast Paper*. All that I have benefited by it, is to remember a proposition made in Mr. *Hartlib*, concerning the improvement of *Houses of Office*, which I will set down as being more *materiall* to the *publick*, and indeed more conducing to illustrate his *Speculations* than any thing he hath alledged.

Hartlibs legacy Pag. 180.

——— *I have seen Fifty pounds worth of* Salt Petre *extracted out of a vault at* Dowgate, *not very Spacious, which was formerly* an House of Office, *and not emptyed till the matter was throughly rotten. Why may not the same thing be done by* Art, *which was formerly done by* Nature *and* Accident? *I have been credibly informed that such a work is ordinarily done in the Kingdome of* China *and also at the City of* Paris *in* France: *and I see no reason why* English-men *should not have as much wit as they. If any man hath convenient Room to build two* Houses of Office, *and to close up the one whilest he useth the other, then there can be no question but that instead of the charge of emptying, and noysomeness of smell, he may have it emptied for nothing, and*

feel

feel the ſweet ſmell of money very gratefull to moſt men, and that in as great or greater quantity than he receiveth for his ordinary edifices: beſides that, he will ſhew himſelf to be a good member of the body politick in which he lives: but he muſt beware that the matter lye dry, *and that no adventitious* moiſture *come to it from* beneath *or* above; *which will be ſomething more chargeable in moiſt grounds than where the Earth is very dry by its own nature.* Agreable to this is the practiſe of our *Salt-Petre-men*, who as often as they meet with any old *vault* of this kind, they make uſe of it to extract their *Minerall*, as being inferior to no *Earths*. And *Baccius* relates that near a certain town, which he calls *Oppidum Fabrianum*, there was a deep and cloſe *Grott* under the *Appennine*, in which Millions of Owles did lodge themſelves, their dung had been accumulated there for many centuries of years: out of this the *Salt-Petre-men* extracted ſo much of *Nitre* as amounted to an *ineſtimable ſumme of money.*

Andras Baccius de therm. l. 5 cap. 7.

So Kircher. Mund. Subter. l. 6. Sect. 2. cap. 4.

And not long agoe, whereas in the Warrs betwixt the *Crim Tartar* and *Polonians* towards *Muſcovy*, great numbers of people being ſlain in battails were buryed for haſt together in *great cavernes* in the Mountains, & ſo rotted there: out of *that Earth* in the *Cavernes* there was extracted a great quantity of *Salt-Petre.* From theſe premiſes, and from the conſideration of the dung of *Kine, Horſes, Goates, Swine, Sheep*; out of all which *Salt-Petre* is extracted in great quantities, it ſeems as if one might with ſome *Speciouſneſs* argue, that the *Salt* in *Animals* (which is a great ingredient in their nutrition) were nothing but *Nitre altered a little from its firſt complexion.* But whoſoever ſhall conſider with *Glauber* that circumſtance of a *long putrifaction*, and how neceſſary it is the *Earth* be *Animated* and *impregnated* by the *Aire* (ſo that in *Churches* where it is *paved*, they look not for *Petre* but in *open floores* or *Seats* that are *looſly boarded*) and by what *degrees* and *rudiments* it proceeds to *common Salt* (as I ſuppoſe in this caſe the immature Earth abounds with *that* which is afterwards turn'd into *Nitre*, and the Northern Countries that yeild little *Petre* are impregnated with *that Salt*) to *common Salt firſt* (except a powerfull *Seminality* intervene

Glauber. Proſper. Germ. part. per. pag. 96.

Caſimir Semienowicz. art mag. artiller. p. 1. l. 2. c. 2.

as in aſhes impregnated with *Mothers*; in Earth mixed with the *Scumme* or *aſhes* aforeſaid) and after into *Salt-Petre*. Whoſoever ſhall conſider this will be apt to reject that *concluſion*, and think that ſince no *Chymiſtry*, nor other *Artifice* can diſcover any *Petre* in *Animals* at firſt, that whatever *Salt* there is in *Animals* and their *excrements*, it more differs from *Salt-Petre* than the change of its *Complexion* amounts unto, and that it is a kind of *Seminall principle* derived from the *Aire*, or ſome other way, that generates by *real tranſmutation* the *Salt-Petre* out of the *volatile* and *fixed Salts*, and (perhaps) *other particles* of *their bodies* and *Excrements*.

I ſhould here conclude my Animadverſions upon this *Hiſtory of Salt-Petre*, but that I think it neceſſary to ſhew the world what a *Plagiary* this *Virtuoſo* is: This *Theory* of *his* with which he ſeems ſo much delighted, is but a diſguiſe of what *Glauber* hath publiſhed in his works, and inculcated more than once. That *inquiſitive* perſon tell us, that there is a certain *univerſall Salt* diffuſed through all parts of our *Globe*, and that the three Kingdomes, *Vegetable*, *Animal*, and *Mineral* are impregnated *therewith*: and that this *Univerſal Salt* is of ſuch a nature that if it be *animated* ('tis his own word) by a certain *Nitrous principle*, *Spirit* or *Seminality*, it will become *true* and *inflameable Petre*. That this *Nitrous Spirit* can never be *incorporated* or *coagulated* of it ſelf: but that it muſt be Sociated with ſome *Saline bodies* and then it becomes perfect *Nitre*. And however he allowes a regard to the *volatile* and *Urinous Salts* as things moſt facile to *impregnate* with and *tranſmute* into *Salt-Petre*; yet doth he aſcribe as much to the *fixed* (though the progreſs be ſometimes ſlower) as to the *Volatile Salts* in this caſe. *Equidem lubens fateor,, quod Spiritus Nitri ex omnibus fixis Salibus ſibi corpus aſſumendo, ad priſtinam Salis-Petræ naturam reverti poſſit.* From this opinion of *Glauber* (who ſometimes ſpeaks *looſly*, and calls the *Salt* in *Vegetables*, and *Animals*, and *Minerals Nitrous*, and even *Nitre*) did Mr. *Henſhaw* borrow his Notion of this *Nitre* that is diffuſed through all the *Elements*, and *diſguiſed* in *Vegetables*, and

Glauber. appen. qu. part. Proſper. German. Pag. 23.

and *Animals* and *Minerals*, which *he* omits; fooliſhly!) *Animalia nulla ſibi alia quærunt alimenta, quam quæ terra ipſis ſuppeditat, quibus* Sal-petræ *omnino adeſſe debet.* Salpetræ itaq; eſt omnium vegetabilium Mineralium et Animalium UnicusServator.—*Sal eſſentiale vel naturæ nihil aliud eſt quam* Salpetræ, *non tamen* ardens *niſi* animatus *fuerit per aërem, et ex eodem* vitam *aut* eſſe ſuum *hauſerit.* —— *Cuncta hæc in omnibus rebus nitrum* OCCULTUM *latere ſatis ſuperq; arguunt. Sal enim mundi, ſive Sal Univerſale et eſſentiale nihil eſt aliud quam Nitrum poſtquam Vitam ex aere extraxit.* What *Glauber's* Opinion is may be gueſſed out of what I have already alledged out of him, where he particularly explains himſelf. How — our *Virtuoſo* hath *diſguiſed* and *declared his*, I have alſo ſhewed. But perhaps you will ſay that Mr. *Henſhaw* never read *Glauber*, at leaſt *he never takes notice of him*: I anſwer, that in not mentioning of *him* he ſhews his *diſingenuity:* but *Glauber's* treatiſes relating to *Salt-Petre* were publiſhed in the years 1656, and 1659. And that Mr. *Henſhaw* did read him it ſeems evident from this, that his *Hiſtory of Salt-Petre* ſeems rather to be tranſcribed from out of *Glauber's* third part of the *Proſperity of Germany* (who tranſcribed it out of *Lazarus Ercker* overſeer of the *Emperor's* Mines) than from any *Experiments* or *obſervations* of his own and other *Salt-Petre-men*, (with whom *perhaps* he *lightly* diſcourſed) whatever he pretended the begining of his *Hiſtory*: *pag.* 261. For had he minded the *work*, he could not have committed ſo many *Errours.* I believe that I ought to rectify Mr. *Henſhawe's* computation of what *Petre* the liquor holds by computation before it be put into the *Aſh-tubs pag*: 270. and that for *thirty five pound* it ought to be *twenty five pound*: for ſo 'tis in *Ercker*; who followes that way of calculating, which I believe our *Petre-men* do not. Sure I am, that whereas Mr. *Henſhaw* ſaith that the *liquor of the ſecond boyling* when it is ready to Cryſtallize *contains in every hundred-weight about threeſcore and ten pounds of Petre.* That *Ercker* ſaith: *Liquore ſic perfecte parato, ex centenario ejus plus quam* 70 *l. Saliſ-Petræ proveni-ent.* That *S*igne alſo of ſecond boyling being boyld to a

Proſper. German. part. 3. *pag.* 112.

proſper. Germ. part. 2 *p.* 66.

juſt height, by hanging like Oile on the Scummer, as falſe as it is, is out of *Ercker*, viz. *Ligula ipſa liquoris bonitatem denotat, ubi liquori immiſſa et iterum extracta ipſum inſtar olei ſibi adhærentem exhibet.* Several other paſſages there are, which ſeeme taken out of *Ercker*, about the colour of the *Un-refined Petre*, and the miſtake about the *Mother*, or liquor which remains after *coagulation* how it is to be diſpoſed of. The caſting in of *Vinegar, a pint at a time, and the riſing of the black Scumme* (*pag* 273) is the one a direction, the other an obſervation of *Erckers*. The Caſting in of *quick-lime to make the Petre whiter, and rock the better; the injecting of burnt Allom* before that: are the documents of *Ercker*, but not that I hear the practice of *England*. The covering the *Trayes* with cloaths, to make the *Petre begin to ſhoot at the bottom and Rock into fairer Cryſtalls*; Theſe and *many other circumſtances convince me that Mr.* Henſhaw ſtole *his narrative*, and *then certainly* fetcht his —— from no other place. Onely he Spoiles a plauſible *Theory*, and tells us he is *much delighted* with it: and no doubt thereof: So were ſome of the *Society*, and it was an Extraordinary apprehenſion they had of the *worth* of this *Hiſtory* that they inſerted it into Mr. *Sprat*'s Book: and truely I was as *much pleaſed* thereat, as *They* could be.

Animad-

Animadversions upon the History of making of *Gun-powder*, written also by Mr. *Henshaw*.

Pag. 277.

IF *some of our Wits* were not such Enemies to *Logick* (a part whereof is *Method*) I should have expected to have found in the continuation of the *History of Gun powder* some mention of *Brimstone*, and its *refining*. And I should have expected a discourse concerning *mute powder*, which however it be not *efficacious*, yet is it a *sort* of *Gun powder*, and a *noble experiment*. And perhaps it might not have been unworthy the curiosity of an *accurate* Historian to have treated of those preparations of *Gold* and *Steel*, which are called *Aurum fulminans et tonitruans* or *crepitans*, *Ceraunochrysos*; *Mars tonans*: and that other made with *common Sulphur*, and published by *Rolfincius Chym. in art. red. l.* 5. *Sect.* 2. *c.* 28. These he might very well have inserted, and neither have *Invented over again* (a thing *usuall* with our *Virtuosi*) or have related them as *secrets* imparted unto him by an *Ingenious friend* or Member of the *Royal Society*: which is *agreable to their practice*: thus particularly Mr. *Hooke* suggests unto us the usual Study of the *Signatures of Plants* upon the observation of an able *Physitian*, *a friend of his* whereas that discovery is as old as *Paracelsus* and *Crollius* and in reference to his insinuation of the vertue of *Poppyes* from the Signature, I shall add this *digressing* passage out of *Conringius in addend. ad. med. Hermet. pag.* 400. *Nec verò capiti prodest vel nymphæa flos uel papaveris caput, quòd imaginem aliquam capitis præbeant: omnibus enim ejus affectibus deberent prodesse et solis, siquidem agant Specificâ quadam, ut loquuntur, facultate, et capiti proprie sint dicata. Sed et illa capitis effigiem non aliter præ se ferunt*

This is a particular way of clarifying the *Brimstone* and fortifying it so as to be much more serviceable: which any one may read in *Casimirus Semenowicz p.* 1. *l.* 2. *c.* 9. There is an account of *mute Powder* (though not tried by him) in the same Author and a way to take of the crack of *Gun-powder*, in *Untzerus de Sal. c.* 29. of which we heare not a word.

Vide Chrysioscopion Casparis.

Amthour cap. 5. *Sennert. de coas. et diss. chym. c.* 19.

Cnierograph. observe. 30. *pag.* 155.

ferunt quam poma omnia imo omnes seminum folliculi, quæ tamen nemo duxerit capiti singulariter prodesse. Infinitis exemplis vanitatem doctrinæ ostendere est, si opus fuerit.

But these are not his only *omissions*; for it became him in the *first place* to have represented unto us the *facile* and less *artificiall* waies of making *Gun-powder*, & then the more *elaborate* procedure at the *Powder-mills*. But our *Virtuoso* is above those pedanticall rules of *Logick* and *History*, by which *vulgar Wits* are regulated. Because I think it no *unnecessary* instruction, I shall set down a Method of making *Gun-powder* without any *Mill* at all, as *Casimirus Semienowicz* reports it. "many of our *Country-peasants* know how to "make *Gun-powder* without the use of any *artifice* or *ma-*"*chines*. For we have seen many of the inhabitants of "*Podolia* and *Ukrain*, who are termed *Cosacs* making *Gun-*"*powder* after another manner then is commonly practised. "They take *certain* proportions of *Salt-Petre*, *Brimstone*, and "*Coal*, (which proportions they have learned by long "practise) & put them into an earthen vessel, adding there-"to some fresh water, they boile it over a slow fire for two "or three houres, till the water be evaporated, and the "materials grow thick and Stiffe. Then they take the "mess out of the pot, and drying it a little more in a Stove "or in the Sun, they pass it through an haire sieve, and so "*granulate* it very small. Others take the materials desig-"ned for *Gun-powder* & either upon a plain polished Stone, "or in any Earthen Vessel grind them and mixe them well "together and incorporate them: then they moisten it, and "so granulate it. Betwixt this way of the *Cosacs*, and "that of *Vannuccio Biringoccio* there is a little difference, "which makes me set his down apart. "Having weigh-"ed the materials, each by it self, and having beat and "searsed them each apart, in the end (as the best and spee-"diest way) to compose them together, take the quantity "of *Nitre* you are to use, and put into a Caldron with so "much water as, putting it on the fire to heat, you think "will dissolve it; then take off the Caldron and set it on "the ground in a firme place, and then put in the quantity

in Art. mayn. Artiller. part. 2. l. 2. c. 14.

of

"of the *Coal* by little and little, ſtirring it about untill it "is well incorporated with the diſſolved *Nitre*: then take "your *Sulphur* finely powdered and ſearſed, and ſtir it in, "ſtirring it continually about with a wooden peſtell, un- "till you have well incorporated all together, and made "the *Coal* fine and impalpable, if you can: then dry it from "all moiſture and ſearſe it very well thorough a fit ſerſe; "and then wet it with a little common water, or a little "Vinegar, and laſtly thorough a ſieve or ſearſe grain it, "and then again dry it well for your uſe.

"To paſs by his *defects* it is a *notorious untruth* with "which he begins his Hiſtory. The materials of *Gun-* "*powder* are *Salt-Petre*, *Brimſtone*, and *Coal*. —— The *Coal* "MUST be Withy and *Alder* equal parts: for Withy "alone is counted too ſoft, and ſome do commend "*Hazle* to be as good as the other two. —— I find that thoſe that made *Gun-powder* at *Coventry* during the late Warrs uſed any *light-wood-coal*, as *Maple* and *Aſpe*: and thought their *powder* as good as any could be. Some have told me that they have known *Birch-coal* very good. I find *Botallus* to reckon up as ingredients promiſcuouſly uſed in the making of *Gunpowder*, *Carbones Cannabinos, ſaliceos, vel juglandeos*. and *Semienowicz* ſaith that if you cannot get enough of *Withy*, or *Hazle* to charre: "*Si Salicis et coryli ſufficiens non* "*detur copia ad urendos carbones, vices horum tilia ſicca ſup-* "*plere poterit. Si exiguam aliquam carbonum portionem præ-* "*parare cupis, virgulta ex coryla et ſalice, vel lignum tiliæ aut* "*janiperi in parva fruſtula ſecta, et optimé ſiccata vaſi alicui* "*teſtaceo includito, et operculo figulneâ cretâ ad orificium vaſis* "*firmato, poſtea candentibus undique ſtipatum prunis, per unius* "*horæ Spatium ibidem in uno continuo et æquali ſemper caloris* "*gradu manere ſinito. Frigeſcat tandem ſua ſponte, et uſti eximan-* "*tur carbones. Sunt qui mappas et lineam telam vetuſtam bene* "*et ſiccatam hoc modo in carbonem redigant; cujus etiam non* "*ſpernenda virtus in re Pyrotechnica*. I find another excellent writer of *Pyrotechny* one Signior *Vannuccio Biringoccio* a Nobleman of *Sienna* Printed at *Venice* the third time in 1559. to uſe other materials for his *Coal* then our *Virtuoſo* propounds

de vulner: ſclopet. 911.

Dr. *Read* alſo reckons them coals as mude indifferently of *Willow*, or *ſtrikes* of *Hemp*: of wounds *lit.* 15. *Art. magn.* or till. *p.* 1. *l.* 2. *c.* 13.

propounds. "To make the *Coal* ſome beſides *Willowes* uſe "the branches of vine: ſome make it of *Noccido* a *Nut tree* "*Hazel*, *bay-tree*, of the bark of the fruit of the *pine*, and "ſome of thoſe twigs they make *Baskets* with, ſome of "young Elder, and ſome of *Cane* or *Reed*: and in fine, thoſe "coales that are made of *gentle*, *pliable* and *flexile* wood "with pith enough, and that be fine and young and with-"out hard knots, are fit for this uſe, and it is made in divers "manners in great quantities. It is made after the faſhion of "*common coal*. Thoſe *Virtuoſi* that have little to do, uſe to put "*twigs* ſplit into a large pot or other Veſſel of Earth, Iron, "or Braſs, and cover or lute it well about that nothing may "reſpire; and then make a fire upon it, continuing it ſo long "that they beleive the twigs are ſufficiently burnt without "flame; and then they let them coole, and take the *coal* for "their uſe. When I have had preſent need I have done it "without all this adoe I have taken a quantity of clear "dry twigs, and broke them to pieces and laid them on an "heap cloſe, and ſet them on fire, and let them burn well: "then with a Scoop or a ladle I have ſprinkled water on "them, and then gently ſcatterd the fire and quenched "them.

But whatever the common practice be, the addition of *coal* is not ſo *neceſſary*, but ſome other things may be ſubſtituted inſtead of it, which practice is uſual with thoſe that make *Gun-powder* of ſundry other colours beſides black.

De pulvere pyrio variis coloribus colorato.

Caſ. Semienowicz. art. mag. art. p. 1. l. 2. c. 15.

Pulveris communis pyrii nigredo ex carbonum atro colore reſultat. Poſſibile tamen eundem alio quoq; colore tingere, ſi carbonum loco vel lignum putridum, vel papyrus alba humefacta prius poſtea in furno calido ſiccata et in pulverem trita, vel aliud quidpiam ſimile, facile ignem arripiens et combuſtibile (ut in ſequentibus patebit) ſumatur, varijq; colores addantur. Proponemus igitur hoc capite mixturas aliquot ex quibus ipſimet propriis manibus ſæpius variis coloribus coloratos confecimus pulveres.

Pulvis

Pulvis albus.

1.

Salisnitri lb. 6. Sulphuris lb. j. medullæ ſambuci exiccatæ lb. j.

2.

Salisnitri lb. 10. *Sulphuris* lb. *j. corticum vel partis lignoſæ Cannabi decuſſæ* lb. *j.*

3.

Salisnitri lb. 6. *Sulphuris* lb. *j. Taratri ad albedinem calcinati, dein in aquâ communi in ollâ non vitreatâ ad evaporationem totius aquæ cocti unc.*

Pulvis rubicundus.

1.

Salisnitri lb. 6. *Sulphuris* lb. *j. Ambræ* lb. *ſs. ſandali rubri* lb. *j.*

2.

Salisnitri lb. 8. *Sulphuris* lb. *j. papyri exiccatæ et in pulverem tritæ, et in aquâ cinnanobaris aut ligni Braſiliani coctæ et iterum exiccatæ* lb. *j.*

Pulvis luteus.

Salispetre lb. 8. *Sulphuris* lb. *j. Croci ſylveſtris cum vino adusto prius cocti, dein optime exiccati et pulveriſati* lb. *j.*

Pulvis viridis.

Salisnitri lb. 10. *Sulphuris* lb. *j. ligni putridi cum æruginæris et aquâ vitæ cocti, dein exiccati* lb. 2.

Pulvis cæruleus

Salisnitri lib. 8. *Sulphuris* lib. *j. Scobis ex ligno tilie cum indigo et vino adusto coctæ, dein exiccatæ et pulveris atæ* lb. *j.*

It might have become our *Virtuoso* in an *History of Gunpowder* not only to have declined these *Errors* and *Mistakes*, but to have treated of *these* sundry sorts of powder, thus coloured: as also to have taken notice of the difference betwixt *Cannon-powder* and that which is used for *Musquets* & *Pistolls*, which distinction, as observable as it is to every ordinary person, is not taken notice of by our *Historian* further then that out of the *same mass* the *great cornes serve for Cannon powder, the less for musquet and pistoll.* whereas great Artillery requires other powder then the small; & the *materials* of *Gunpowder* are *differently proportioned* to make up the several powders as appeares by the *pyrotechny* of *Vannuccio Biringoccio.*

To make common powder for *great Artillery.*

Take of Nitre refined three parts.
of Sulphur 1 part.
of Coal of Willow 2 parts.

To make that for the middle sort of *Artillery.*

Take Nitre refined 5 parts.
Coal 1 part and an half.
Sulphur one part,
Let it be well incorporated, granulated and dryed.

To make that for Arquebusses and Pistolls.

Take Nitre refined 10 parts.
Coal of Hazell-twigs cleansed 1. part:
Sulphur 1 part.
Some to make it better.

Take

Take Nitre, 13 parts and an half.
Coal two parts.
Sulphur one part and and an half.

Let them be well beaten and incorporated &c.

I find alſo the accurate *Caſimirus Semienowicz* to make a treble diſtinction of *Powder* which I ſhall ſet down, as being the *beſt* and moſt *approved in the world.* which when I have done we ſhall not much lament the concealment of that *cheat* or *ſecret* Mr. *Henſhaw* could well learn, but with promiſe not to divulge it: it not being other then to ſubſtract from the *Petre*, and make up the weight in *coal* whileſt (by this improvement of *Gun-powder* by the *Virtuoſi*) his *Majeſty* payes as if there were the proportion of *Salt-Petre*,

Mixturæ ad triplicem pulverem conficiendum optimæ probatiſſimæq;.

Mixturæ pulveris ad tormenta Majora.	*Mixturæ pulveris ad Sclopeta majora vulgo muſquetas.*	*Mixturæ pulveris ad Sclopeta minora, vulgó piſtolos et alia.*
1	1	1
Salisnitri lb. 100.	*Salisnitri* lb. 100.	*Salisnitri* lb. 100.
Sulphuris lb. 25.	*Sulphuris* lb. 18.	*Sulphuris* lb. 12.
Carbonum lb. 25.	*Carbonum* lb. 20.	*Carbonum* lb. 15.
2	2	2
Salisnitri lb. 100.	*Salisnitri* lb. 100.	*Salisnitri* lb. 100.
Sulphuris lb. 20.	*Sulphuris* lb. 15.	*Sulphuris* lb. 10.
Carbonum lb. 24.	*Carbonum* lb. 18.	*Carbonum* lb. 8.

Mixturæ pulverum ad Tormenta & Majora Sclopeta, inter pinſendum vel Simplici aquâ tantum, vel aceto, vel urina, vel vino aduſto humectari et inſpergi poſſunt. Sin autem ad Sclopeta

minora ſortiorem vegetioremq; exoptamus pulverem, ſuperiores duæ mixturæ ſequenti liquore, vel aquâ ex corticibus malorum Aurantiorum, et Citrinorum, et Limoniorum recentium Chymicis organis diſtillatâ inspergantur ſæpius, pinſenturq; per Horas 24 deinq; in minutiſſima granulentur.

Liquor autem componitur ex vini adusti menſuris 20. Spiritus aceti ex vino albo diſtillati menſuris 12. Spiritus Nitri menſuris 4. Aquæ ſimplicis ex Sale Armeniaco menſuris 2. Camphoræ ex vino aduſto ſubactæ, vel cum Sulphure trito pulveri ſatæ, vel deniq; cum oleo Amygdalarum dulcium in oleum redactæ, menſurâ 1.

Aqua ex Sale Ammoniaco.

Rec. Salis Ammoniaci 3 drach. Salis-Nitri unc. 1. redigantur in pulverem tenuiſſimum et probe miſceantur: poſtea in Alembicum imponantur, et aceto fortiſſimo infuſo, diſtillentur igne lento

I have oftentimes wondered with my ſelf how it was poſſible for Mr. *Henſhaw* to penne, and for the *Royal Society* to approve ſo pittyfull an *Hiſtory* of *Salt-Petre* and *Gun-Powder*. They are certainely a lamentable ſort of *Scriblers*, that write ſo *ill*, having ſo *good Copies* before them! That noble *Siennois* whom I have already cited; *Nicolo Tartaglia* in his *Queſiti et inventioni diverſe*: and *Pietro Sardi* in his book *L'Artiglieria* have written excellently well of *this ſubject*: and in the year 1650 *Caſimirus Semienowicz* a *Lithuanian* Knight and formerly Lieuetenant of the Ordnance to the King of *Poland*, publiſhed a moſt Elaborate diſcourſe about the uſe of the *great Artillery*; He was a man that made thoſe ſtudies his buſineſs & having ſignalized himſelf byhis skill in the management of all manner of Artillery, he was employed & H noured by *Uladiſlaus* the 4 th. King of *Poland* & *Sweden*, by him incouraged to that work, & to accompliſh it the better at his charge ſent into *Holland* there to perfect his knowledge. This *Eminent* perſonage in the ſecond book of his firſt part hath handled all that appertaines to the making of *Salt-Petre* and *Gun-powder*, to the tryall, and to the keeping of it: And were not the diſcourſe too long, I had inſerted it here but becauſe I have already made uſe of ſeveral paſſages out of him, I ſhall here adde the diſcourſes onely of *Pietro Sardi* and *Nicolo Tartaglia*; where they are *defective* or need

nced amendment I ſhall ſupply all out of *Caſ. Semienowicz.* whom *Kircher* calls *Semienovius*, in his *Mundus Subterraneous*, and out of him tranſcribes moſt that he hath about this ſubject there.

The Diſcourſe of *Pietro Sardi* about *Salt-petre*, & *Gun-powder*, in his book *L' Artigleria lib.* 3. *Cap.* 49, 50, 51, 52, 53, 54. printed in *Venice*, in folio.

Sal Nitri, being the Ground-work, ſtrength and Spirit of the Powder which by the *Quantity* and *Perfections* of the *Nitre*, is ſaid to be more or leſs *fine* and *effectual*, it ſeems good here to diſcourſe ſomewhat concerning it, *whence* it is *Generated*, how *made* and *Reduc'd* to perfection; to the end the *Gunner* in every occaſion, (wanting *Powder*, *Powder-makers* and *Saltpetre-men*,) may know how to make it, if not in that *perfection* which the *Saltpeter-men* do by their Art, yet at leaſt ſuch as may ſerve in time of *Neceſſity*.

Sal Nitri is Extracted from the Earth in great quantities, and from *Walls* in ſmall; to wit, from that Salt, which ſome walls of *Cellars* and *vaults* under Ground, expoſed to Humidity do ſpue forth.

It is drawn from the Earth, but not in all places, but ſuch as are *Proper*, as thoſe are, that are *obſcure* and *Cavernous*, whete the rain falls not, as in the *ſtalls* of Animals great and ſmall, and Particularly *Goats*, *Sheep* and *Hogs*. In *Gaſcoigne* in

Terra et materia Salnitroſa plerumque reperitur in maxima copia in locis obſcuris, umbroſis, & cavernoſis, ad quæ tam radijs Solaribus, quam pluviæ et omni dulci aquæ aditus præcluſus eſt. Tum etiam in equilibus, & aliis clauſtris non Subdialibus, ſed tectis, ubi omnis generis pecora: ut ſunt boves, capræ, ſues, oves, et his ſimilia alia locari et concludi: necnon ubi homines ipſi urinam reddere ſolent. Tum denique in illis locis in quibus poſt campeſtria commiſſa prælia, plurima cæſorum militum corpora in foveas conjecta, et ſuper his immenſæ terræ moles ſuperextructæ ſunt. Ex his poſt multa annorum intervalla, plurimum materiæ Salni-troſæ erui vidimus in Valachia et Podolilæ deſertis inter Bohem, et Boriſthenem. *Caſ. Semienowicz* p. 1. l. 2. c. 2. yet in *England* I cannot hear that they digge for it in places dunged with *Sheep* although the *Covert*, and time may have ſeemed to have concurred apparently to generate it.

France, I went in the company of the Commissary of the *Artigliery* of the City of *Burdeaux*, through the *Caverns* of the little hills and Mountains, that are scituated on the River *Garonne*, drawing and digging in many places, Great quantities of this *Salt-petre-Earth*; and in *Brussels* I have seen them draw *Sal-Nitre* from *Rubbish* and *Dust* of old *walls*.

And in *France* there is *Commission* given to the Principal officers of the *Artillery*, dispersed through that vast Kingdome, to enter into all houses *private* and *publique*, to find out such *Salt-Peter-Earth*; and the private persons are forced to be patient because it is for the service of the *King*.

There are *Three* ways to know if the *Earth* be Pregnant of *Salt-Petre*. 1. with the *Mouth*, putting a little on the tongue, if there be sense of a *biting* tast. 2. with a *Burning* Iron, thrust into a hole made with a Sharpe woodden Stick, and suffering it to Coole there; and if upon drawing it out it appears of a *yellow* whitish Colour, it is a signe there is *Nitre* there, but if it remains of the natural colour, it is unprofitable. 3. It is proved likewise, taking a handful and sprinkling it lightly on burning Coales, if there be perceived any crackling noise, and any sparkles issues forth speedily, it shall be a sign of *Salt-petre-Earth*, otherwise of none.

Having got great quantity of this pregnant *Earth*, you ought also to have Ready a good quantity of Ashes made of *Oake*, * *holme Oake*, or * *Vine-branches* or some other Strong wood, with a sufficient quantity of *Quick-lime*, which things being thus prepared, take *two parts* of the said *Lime* and *three* of *Ashes* and let them be well mingled together.

Let there be also prepared a *Great* * *vessel*, placed on high, in such manner that under it may stand another vessel to Receive the water, that shall be strained from that above.

In the *upper Vessel* shall be put *broom* or *straw* in the Bottom or plain, and over the hole where the water is to issue out, shall be placed a Piece of a *Tile*, or some such thing as the women do in their *Bucks*, and the Hole must be shut very well.

Afterward take the *Sal-nitrous* Earth moderately *dryed*, and put it into the vessell a handfull thick, and upon that a ground

These three ways are approved by *Cas. Scmienowicz*; but if he say that. *Salt-petre-earth* bites a little to the tast. *linguam mordacius corrodit*, he doth not say it is *bitter*, as Mr. *Heashaw* doth. p. 266:

Si citrei et ad albedinem vergentis aliquantulum coloris in ferro frigefacto signa inveneris de valor et bointatet erre non dubties. *Cas. Semienowicz. p. 1. l. 2. c. 2.*

Si strepitum aliquem edere et lucidos in altum surgere favillos observaveris, multo sale ni-tri terram ejusmodi abundare judicabis, *id. ib.* Cineris usti ex robore, fraxino, ulmo, acere vel aliis fortibus et duris ligni s *ib.*

* Cerro.

* Sarmenti signifies also flags, segs, or Reed growing by the waterside, Hujus cineris sumantur partes *duæ*, et calcis viva *tres* ac una bene miceantur. *id. ib.*

* Tinaccio, a tun, *Bugida*.

Ground (of two or three fingers high) of that *Aſhes* and *lime* mingled together, and then a ground of *Earth*, and againe of *Aſhes* and *Lime*, continuing this Courſe untill the veſſell be full within a handful and an half.

Paululum exſiccata. *Caſ. Semienowicz*, ubi ſupra

This being thus managed, let it be filled up with common water ſweet and clear in which is not the leaſt ſalt, and becauſe the Earth will quickly ſuck up the water, let it be put in ſo by degrees till the Earth will admit no more, and the veſſell be filled equal to the Earth, and not higher.

Infundatur recentis et dulcis aquâ tantum, quantum ſat eſſe videbit ut atque duos tresve digitos, terræ ſuper extet. *id. ib.*

It being thus filled, let it ſtand twenty four hours, or more, after which time open the tap-hole, and let the water ſtrain into the veſſell underneath, which being all ſtrain'd, let that water be emptied into another veſſel or Tun and reſerved, and then put in ſome freſh water into the *Earth-veſſel* as before, letting it ſtand for the ſpace of twelve hours, then opening the *tap-hole* again let it ſtrain into the veſſel, which done, put apart into another veſſel this liquor, and not in the firſt: Do this a third time and empty it into a third Veſſel.

Untzerus preſents us with another way of making *Salt-Petre*, which becauſe our *Hiſtorian* hath omitted, I ſhall ſet down: *Terra nitroſa aqua multa diluatur, dcinde ad purum colatur. colatura ſi non ſatis dives halinitro eſt, denuo apponitur materiis et iterum cocta facto ſedimento per lacinias tranſfertur in vas purium ibique coquitur, ad juſtam conſiſtentiam Decoctum inf rtur in Ollam, Digeſtum per dolia et alveolos, cryſtali congelati eximuntur, reſiduus liquor recoquitur ad medias vel tertias donec cryſtalli. et ſic per-*

This being done, make proof of theſe three waters by putting ſome few drops on your tongue, and taſting it you ſhall find the firſt *very biting*, the ſecond leſſe, and the third leaſt of all, for the firſt draws more of the ſubſtance of the *Salt-peter*, then the ſecond, and the ſecond then the third.

But there may be the fourth operation, for ſometimes the *Earth* doth retain ſo much *Nitrous* ſubſtance therein, that it may prove advantageous even to the fift and ſixt time; and all the waters are to be reſerved apart, with the diſtillations of the firſt, ſecond, third &c. as many as there ſhall be.

By this operation of one veſſell or tun, may be apprehended the manner of making an hundred or as many as you pleaſe, according to the Quantity of the Prepared *Earth*, obſerving always that the firſt waters ſtrain'd be put in one veſſel, or in what will contain them, and all the other waters (Careleſly) in one or more veſſels that will hold them.

Theſe laſt waters ſhall be taken and forced to paſs over New *Earth*, operating as before, and ſo many times ſhall they

genum donec totum coagulaverit. Untzer: de ſale c. 18.

Pass over new earth untill you find the water sufficiently impregnated with *Nitre*, which you shall easily know by the tast; for the tongue will be hardly able to indure it for the great heat, and the waters will bear almost a new layd Egge without sinking to the bottom.

Igne lento prius, dein fortiori decoquatur ad consumptionem unius tertiæ. *id. ibid.*

Having Collected a sufficient quantity of this *Nitrous* water you must put it into one or more Great *Brazen* or *Copper* caldron (like those of the *dyers* accommodated to a fornace) which being filled of two thirds of such liquor (i. e.) in such manner that a third part of the caldron be yet empty, give fire to it at first gently, afterwards more strongly, by degrees, untill the boyling be well advanced, and so continue untill the caldron be but one third part full of liquor, or to say better untill but half of what was put in do Remain.

Coque ad consumptionem medietatis, vel quousque spissior et densior evadat. *id. ibid.*

The waters of one or more Caldrons being boyled and reduced to such a Quantity, let them be gently taken out, and put in a Capacious Tun, or Tuns, well hooped with hoopes of Iron, and let them be covered with hempen cloath and tables upon them very diligently, and so let them be left untill they coole, and that they be setled very well in such manner that all the Earthy substance and naughty *Salt*, be fallen to the bottom.

Congeli.

These waters being thus purified let them again be gently (that they be not troubled but the common Salt and earthiness left in the bottom) Returned in to the cleansed caldrons, and they being boyled as at first untill one half be consumed, or at least untill you know it be boyled and be coagulated, which will be known, when taking a little upon a stick and dropping it on a Polish'd marble or stone, if it remain congealed, or to say better thickned, it is a sign it is boyled, and therefore take it from the fire and suffer it to coole.

Effundatur in ligneos canales, vel vasa alveata oblonga et lata magis quàm profunda: nec tamen plus hujus aquæ sit in uno vase, quam ut spatium unius palmi in altitudine occuper, deinde vasa sineis vel laneis pannis crassioribus contecta in frigido loco ponantur. *id. ib.*

It being thus cooled & clarified, let there be ready some *Trays* made of Planks long & not too large nor too deep, but more large in the top then in the botome, let these be filled with the boyl'd and clarified waters a handful high, putting into them some little sticks of wood without Barke, and cover the *trays*, and let them stand so two or three days, and at that time or longer, according to the season you shall find the *Sal-Nitri*,

Congeal'd.

Congeal'd and cleaving to the ſides of the *Trays*, and the ſticks, (after the manner of clear Chryſtall,) which take away careſully and the water that Remains, let it be put to boyling anew as at firſt, leaving the ſalt and the dregs in the bottome of the *Trays*.

And becauſe the waters in the boyling ſwell, and make a ſcum it will be neceſſary to take away that ſcum carefully, (as they do from the fleſh-pots) and to reſerve that ſcum to throw it upon the Earth taken from the Tuns to reimpregnate it with *Salt-petre*.

Moreover becauſe the water in boyling will ſpatter out of the caldron, to remedy this let there be ready a ſtrong *lie*, made 3 fourths of ferne Aſhes, or the aſhes of *Oak holme*, or *Oak* or with *Aſh*, or *Maple* (ſuch as was uſed at the firſt elixiviation,) and of one fourth of quick-lime, and in the ſaid ſtrong lie, for every hundred pints let there be diſſolved four pounds for *Roach-allum*.

And of this lie ſo prepared, take one or two potfuls, and throw it in by little and little when the Caldron ſwells, and it will preſently be quiet, and deſcend, and become of a clear *Azure colour*, and the dreggs of the common *ſalt* will fall to the Bottome.

Of

Of the manner to refine *Sal-petræ* to make *gun-powder*, cap. 50.

ALL the vigour of *Gun-powder*, consisting in *Sal-petræ*, its quantity, and its *perfection*, if the *Sal-petre* should be put in use of the first boyling, the *Powder* would not be so *perfect* and so strong, as need would require; for the quantity of Terrestriall matter, Common-*salt* and *unctuosity*, which also reside with the *Petre*, do hinder its vertue and strength, and therefore the *Artists* do always anew *Refine* the said *Salt-petre*, and purge it from every extraneous matter, as much as is possible, that they may obtaine the most strenuous effects of *Powder*, that can be desired.

Necessarium bis aut ter (immo pluries adhuc si tanto majorem pulveris effectum habere volumus) purgasse et clarific asse *id. ibid. c.3.*

This Refining is made in two manners, either with water commonly called the *wett*; or with *Fire*, commonly called the *Dry*, or the *Burnt*.

A Guazzo.

The *wett*, or with *water*, is made thus; They take as much *sal-nitre* as they please to *Refine*, and put it in a Caldron over a fornace, and upon that *Sal-nitre* they put such a quantity of fresh and clear water, as may be sufficient to dissolve it; they take notice of the quantity of the water, and for every barrel of water which they put into the Caldron, they put five or six Pot-fulls of that strong *lie*, made of *Ferne*-Ashes, *Oake*, and *Quick-lime*, and *Allum*, and giving fire to the Caldron at first softly, and afterward increasing it, untill the melted *Nitre* boyle and rayse a scum.

Aliquot cyathi; *Cas, Semienowicz. ib. c. 3.*

Sabbione, sand or gravel. Imponatur Sabulonis loti et bene purgati tantum, ut ad altitudinem unius palmi super fundum vasis emineat. *Cas. Semienowicz ibid. c. 3.*

Let there be ready, a great Tun or vessel placed so high that another vessel may stand under it to receive the *Sal-nitrous* water, which by little shall strain from above, and in the said great Tun let there be put a hands-breadth of cleane and wash'd *Sand*, and upon that a great linnen cloth doubled, (as the laundresses do) and on that poure the water from the Caldron, (which contains the melted *Nitre*) as soon as it boyles and the scum is taken from it, and let it strain by little

and

and little by the tap into the veſſel below, as they do in making their *Backs*.

Which water being all ſtrained, let it be put into a cleare Caldron and boyl it till by the proof of a Congealed drop, it may be known to be well boyled, (not forgetting to give it ſome of the ſtrong *lie*, of *Allum*, *Aſhes* and *lime*, when the Caldron ſwells and would ſpatter out the water, and having made proof it is boyled enough, let it be taken out and put into the long *Trays*, to coole as before, and preſerve the congealed *Salt-petre*, and returne the water to boyle again that remains, and againe to congeale, and do ſo untill the water Give no more *Salt-petre*.

Now this *Salt-petre* ſo Refined, is called *Salt-petre Refin'd* of the ſecond boyling, as the *Refiners*, of *ſugar*, call their *Sugar Refined*, of the Second, Third or fourth, boyling, and to make *Saltpetre* of ſuch perfection, you may (as ſome do) *Refine* it, that is Reboyl it, in ſuch manner the third time, proceeding always as before.

Becauſe that there is ſuch difficulty in the depurating of *Salt-peter* from the fixed common *Salt*, Allum & Vitriol which adhere to it, & that, without this be done, no man can judge whether the *ſalt* it leaves upon calcination be from the Nitre, or ſome other body, which by the uſual proceſs even of Mr. Boyle, by filtration and coagulation can never be perfectly ſeparated, nor the *Petre* reduced to cryſtals of the right Signature. *Quocunque enim ſtudio et labore vulgari Salpetræ ex ſtabulis beſtiarum erutus per ſolutionem et coagulationem purgetur, impoſſible tamen eſt, ut munditiem ſuam debitam et Signaturam veram conſequatur.* ſo *Glauber. de ſignat. Sal.* pag. 27. And becauſe the cryſtals of *Nitre* appear beſt in their own ſhapes, after ſuch an ex: & depuration, it may not be omitted to tell you what Mr. *Henſhaw* might have done, for it is evident he had read *Glauber*, viz. that the ſole way of making pure *Nitre*, is to take the courſe Mr. *Boyle* found out, to burne part to an *Alcali*, and to powr upon a filtrated ſolution of that the Spirit of *Nitre*, and evaporating it to a cuticle, to cryſtalize it in a cold place; But there is another way that may not be uſeleſs in *Caſimirus Semienowicz p. 1. l. 2. c. 8. Sume 2 lb. calcis vivæ. 2. lb. ſalis communis. unam lb. viridis æris. 1 lb. vitrioli Romani. 1 lb. ſalis Ammoniaci, omnia ſimul mixta pulveri ſentur: poſtea ponatur omnis materia in vaſe aliquo ligneo, & aceti, vel vini, aut in defectu horum aquæ dulcis limpidæ ſuperinfundatur bona quantitas, et fiat lixivium; Quod per tridui ſpatium ſibi relictum clarescat. Pone deinde ſalem-nitri in caldario, et ſuperinfunde tantum*

tantum lixivij ut ſalem-nitri cooperiat, precoq; lento igne ad conſumptionem mediæ partis totius liquoris: reſidnum effunde in aliud vas, fæces autem omnes immundas, quas fundum caldarij petiſſe videbis foras ejiace. frigescat poſtea aqua ſalnitroſa et ulterius elaboretur, more conſueto, that is in ſuch manner, as is preſcribed by *Sordi* and *him*, in the firſt boyling of *Salt-petre*.

The Refining *Salt-petre* by fire, to wit the dry, is made in this manner, they have a great and capacious and thick veſſel of *Braſs*, *Copper*, or *Iron*, placed on a Fornace, and in that they put, what quantity of *Nitre* they pleaſe, and making a gentle fire at firſt, and increaſing it by degrees untill the *Nitre* be perfectly melted and running, and begins to boyle, and having ready fine powdered *Brimſtone*, they throw ſome of it in the top of the melted *Nitre*, and if the *Brimſtone* fire of it ſelfe, it is well, ifnot with a coale, or having a ſtick they fire it, and this *Brimſtone* ſo fired, they let alone untill it have conſumed all the greaſe which ſwims upon the ſaid *Salt-petre*.

The which being all conſumed, the *Salt-petre* is emptyed into what veſſels a man will, that the Loaves or Pieces of *Salt-petre*, may become large, of which he may prepare what quantity ſhall ſeem ſufficient, and in the bottom of the Caldron will remain the Dreggs and common ſalt, the *Salt-petre* being cooled, becomming like a piece of fine white Marble, &in this manner you may refine it as often as you will, and it ſhal always prove more perfect, and worke greater effects.

Of the Manner how to Re-impregnate the Earth, taken out of the Veſſells with new *Salt-petre*.

HAving taken out the Earth from the Veſſels, after that the water hath extracted al the *Nitrous* ſubſtance therefrom, let it be ſpread on the face of the Earth, but not exceeding a foot thick, and in ſome covered place, that it be ſubject to neither Rain nor the ſight of the Sun.

Which Earth being ſo ordered and ſpread, get a great quantity of Dung, as well of great Cattel as ſmall, and

ſpread

ſpread it on the Earth, as thick as you can, one or two foot thick, or more if you have dung enough.

Upon this dung caſt all the ſcum, and the waters which were taken from the *Salt-petre*, leaving the Earthy dreggs, and the common *ſalt*.

And afterwards gathering in all publique places, in veſſels prepared to that purpoſe, as much Human urine as is poſſible, and every Day caſt it on the *Dung*, and doing ſo at two years end, that Earth will be impregnated, with as much *Nitre* as ever, and it may be with greater advantage.

How to prove *Salt-petre*, to know its fineſs. *Cap.* 52.

TAke a Pound of *Salt-petre*, and put it on a ſmooth white Table, and with burning coales fire it, in the doing whereof note theſe effects.

If it make a noyſe as *Salt* does, when it is caſt on burning coales, it ſhall be a ſign that it reteins in it much common-*ſalt*.

If it make a fat *ſcumme*, it is a ſign it hath too much fatt.

If after it is all burnt, it leave in the bottom filth, it is a ſign it yet retains ſome of the Earthy ſubſtance, and the greater theſe ſigns are, ſo much the more extraneous matter doth the *Salt-petre* contain, and it is ſo much the leſs purified fine, and of leſs Vigour.

But if the flame it caſt be * cleare, windy, long, divided into many parts, after the manner of Brandiſhing Rays, or beams of light, that the Table remain clean, if it is burn'd as pure coale that makes no ſcumme or noyſe, then the *Salt-petre* may be ſaid to be well purified and perfect.

* Si fecerit flammam claram, longam, & in plurimos radios diſpertitam, fundum vero tabulæ remanſerit mundum: arſeritque puri carbonis modo, ſine omni ſpuma & crepitu horrido, minuſque convenienti, purgatum bene & perfectum eſſe ſalem nitri conjecturam capere licebit. *Caſ. Semienowicz. ibid. cap 7.* & *Kircher. Mund. Subterran. lib. 6. Sect. 2. cap. 3.* Quidam injectum candenti prunæ ſpectant, argumento bonitatis & puritatis, ſi diffluat & deflagret ſine reliquiis ſalis communis, aut fœcum terreſtrium, & ſaltu crepitante. *Libazarius, Apocalyp. Hermet. part. 1, cap. 17.*

How to know the goodneſs of Powder. *Cap.* 53.

The goodneſs of *Powder* is known by the *Eye*, the *Touch*, and by the *Fire*: by the *Eye*, if it be very *Black*, or that it is Moiſt, and put upon white paper and tinging it with black, it is a ſign that it hath too much Coal, but if it be of *dark Aſh-colour* and tinge not, it is a ſign that it hath its proportion of *Coal*, and it is dry.

Berettino, Grey or Aſh-colour.

Nimia in pulvere nigredo, ſignum eſt humiditatis: hæc ſi ſuper papyro munda ponatur, & eandem nigro tingat colore, ſignum erit cum plurimum in ſe continere carbonum: cinericius autem ſub obſcurus pulveris color, & aliquantulum ad rubedicem vergens, bonitatis veſtigium eſt. *Caſ. Semienowicz. ibid. c.17.*

With the *Touch* it is known, when rubbing it with the fingers, it appears ſoft and eaſily broken, it is a ſign of too much *Coal*: and when rubbing it and powdering it with the fingers, you feel ſome little knobs that prick the fingers, it is a ſign the *Sulphur* is not well powdered and incorporated, and that the Powder is not elaborated enough.

With the *Fire* likewiſe is known the goodneſs of *Powder*, taking a pound of it, and putting it on a Table ſmooth and white, and near unto it another, a third, fourth and fifth pound, ſo that they do not touch: and then giving fire unto a little heap, if at one and the ſame time all the heaps are fired, if the flame be raiſed clear and quick, cracking in the raiſing, it is a ſign it is fine and well labour'd, but if the flame be ſlow in raiſing and with much ſmoke and without noyſe, it is a ſign of the little ſtrength of it, of the great quantity of *Coal* and *Sulphur* more than it ought.

Denique ignis beneficio in notitiam bonitatis pulveris facile deveniemus: ſi nimirum puſillas aliquot congeries pulveris ſuper tabula lignea munda & polita, latitudine dimidii palmi a ſe invicem diſtantes poſuerimus, & unicam tantum ex omnibus incenderimus. Hæc ſi ſubito flammam conceperit, & ſola tantum, aliis non accenſis, conflagraverit, idque cum fragore & ſonitu quodam: feceritque fumum album, clarum, & in aſcendendo velocem: in aere vero circulus quaſi quidam, ſeu corolla fumoſa appareat, perfectiſſime pulveris nota erit.

If after it is burnt the Table remain black, it is a ſign of too much *Coal*; if *Unctuous*, it is a ſign of the *greaſe* of the *Salt-*

Petre,

Petre and *Sulphur* that were not well refined : and if with earthineſs, and little granulets of matter ; it is a ſign the *Salt-Petre* was not well purged of common Salt, and earthy matter, and that the *Sulphur* was not well powder'd and incorporated ; and if after the powder is burnt, the Table remain whitened, it is a ſign the *Salt-Petre* hath much of common *Salt*, and that it was not well cleanſed from that.

Of *Powder* ſpoiled, and the ways to *Recover* it.

BY *Powder* ſpoiled is meant that which wants much of the vigour and vertue which it had in the beginning : now this want proceeds from no other thing, than that the vertue of the *Salt-Petre* which gives it that vigour is weakned and vaniſh'd.

Now the Vertue of *Salt-petre* reduced into *Gun-powder*, is loſt either by *Age* or *Moiſture* ; by old *Age*, becauſe being conjoy'nd with *Coal* and *Sulphur*, it doth participate of that corruption which will happen to them in time : by *Moiſture*, becauſe the *Salt-petre*, (compoſed of *Salnitrous* Waters, as all other *Salts* of their *Salt Waters*) does no ſooner as it were ſee the moiſture, but by that, by little and little it is converted into moiſture, and the vertue and vigour thereof is exhal'd by that humidity.

Thus a great part of the *Salt-petre* being ſeparated by this Humidity from the reſt of the Compoſition of the *Powder*; and the *Salt-petre* being more ponderous than the other two materials, which are not exhaled, as is the *Petre*; it follows, that of that quantity of Powder which in the perfection of it was incloſed in the Barrel : For example, one hundred pound, after the *Salt petre* is waſted in this manner either by old Age or Moiſture, there will not remain the ſame quantity, but much leſs.

Carbones tamen & ſulphur minime hic ſuo quem antea habuere, privantur pondere, cum nullo diſſolvuntur humore : imo carbones ſtudioſe eum attrahunt, fiuntque ponderoſiores. *Id. ibid. c.* 18.

Now to recover this Powder thus waſted, it is to be done two ways, *viz.* to adjoyn the quantity of *Salt-petre* is wanting to make it *vigorous* and perfect ; or to take away that

Salt-petre which remaining in the waſted Powder, to refine the *Salt-petre*, and to make other *Powder* anew with it.

There is another way of recovering decayed *Powder*, by fortifying it with a certain *Lixivium* propoſed by *Caſ. Semienowicz: p.1.l.2.c.18.* which you may ſee in him.

To recover that ſame weakned Powder, by the vaniſhing of the *Nitre*, proceed in this manner : Take all that quantity of waſted *Powder*, and put it on a cloath, and lay it in the Sun to dry, which being perfectly dried, fill a Barrel with it : for example, let there be one hundred pound :

Then let it be emptied aſide, and let the Barrel be filled with perfect *Powder*, ſuch as was the ſpoil'd in the perfect vigour of it, let it be weighed and noted how many pound it weigheth : for example, ſuppoſe one hundred and twenty.

Here we ſay that thoſe twenty pound more which the Barrel of perfect *Powder* weighed, ſhall be twenty pound of *Salt-petre* which the other wanted.

Now let us ſee how much waſted Powder there is in all, and if there be for example 10000 pound ; for to know then in this great quantity of naughty powder how many pounds of *Salt-petre* there are wanting to reduce it to perfection and vigour.

Work with the Golden Rule of the 4 Proportionals, ſaying, If one hundred pound of waſted *Powder*, there want 20 pound of *Salt-petre*, how much *Petre* will there be wanting in ten thouſand ?

Let the ſecond number be multiplied by the third, *viz.* 20 by 10000, and the product ſhall be divided by the firſt, *viz.* by 100, and you ſhall have 2000 in the Quotient, and theſe ſhall be the pounds of *Salt-petre* which are wanting in the waſted powder to reduce it to perfection.

Let theſe 2000 *l.* of *Salt-petre* be powder'd, & likewiſe the 10000 of bad powder, as the manner is, and taking a proportion, let it be incorporated with the 2000 of *Salt-petre*, beating them together according to Art ; and in ſuch manner working them, there will be made good *Powder*.

If we will take away all the *Salt-petre* out of waſted powder, we muſt proceed in this manner : Let there be prepared one or more capacious Tubbs, and on them let there be laid three or four linnen Cloathes (like the skins of a Drum) well tied, but not ſo ſtrait.

Then

Then let there be another Veſſel or more of Copper or Wood, and put therein the quantity of ſpoiled *Powder*, that ſhall ſeem fit, and pour upon it as much freſh clear Water as ſhall diſſolve it, ſtirring it with a cudgel or a Schoope.

This being liquified, with a Ladle or Bucket, throw it upon the cloath over the Table, that the clear water may ſtrain into the Tubb, and upon the cloath may remain the *Coal* and the *Sulphur*: and when it is all ſtrain'd, throw ſoftly a Bucket or two of water to draw away the ſubſtance of *Salt-petre* that ſhall remain with the *Coal* and *Sulphur*.

And in this manner ſhall be done until all the Salt-petre of the naughty powder be ſtrain'd, drawing away the ſtrain'd water in the Table when it is full, and if theſe waters are not clear, let them be put on again on the waſhed and cleanſed cloath, and let them be ſtrain'd again, until they are clear.

Then take all theſe clear waters and boyl them in the Caldrons as before, and then put them in the Trays to congeal and make *Salt-petre*, and taken and refined, and new *Powder* made of it as the manner is; and the *Coal* and *Sulphur* may be dried perfectly, and proof made if it will ſerve, but if not, you muſt take new *Sulphur* and *Coal*.

But here I do advertiſe that all that is here ſaid, is written only that the Gunner in time of Neceſſity may ſupply himſelf and do the beſt that he can, for ſuch *Salt-petre* and *Powder* is not made with that diligence and *Art* that the *Powder-Maſters* and *Salt-Petremen* do, but yet it will not fail to ſerve in time of Neceſſity.

Dal. Pietro Sardi: in Venet. 1629.

The

The Third Book of the various Queſtions and Inventions of Nicolas Tartaglia.

Of *Sal Nitre*, and the various compoſitions of the Gun-Powder : of the Propriety or the particular office which each of the Materials hath in that Compoſition, and other Particulars.

The firſt enquiry made by Seignior Gabriel Tadino Prior *of* Barletta.

Prior. IS it not to be wondred at, that the Antients had no knowledg of *Sal-Nitre* which to us Moderns is become ſo familiar ?

Nicol. *Yéa, Rather the knowledg of that Simple is moſt Antient ; for moſt of the Antient* Naturaliſts *make mention of it ; true it is that ſome of them, and eſpecially* Avicenna *have called it* Baurach, *becauſe it is ſo called in the* Arabic *Tongue ; ſome* Aphronitum, *becauſe it is ſo nam'd in the* Greek ; *and others as* Serapion, Diaſcorides *and* Pliny *have call'd it* Nitrum, *or* Spuma Nitri, *for the* Latins *ſo call it ; and in the* Pandects *it is affirmed there are two ſorts of* Nitrum, *or* Sal Nitri, *viz.* Mineral, *and* Artificial, *of the* Mineral *they ſay there are four, the* Armenian, African, Roman, *and* Ægyptian. Serapion *ſays, that the* Minerals *of* Sal Nitre *are as the Minerals of* Salt, *for there are found of it, that are* running waters, *which become congealed and condenſed like a ſtone, and this is affirmed alſo by* Pliny, *that it is found alſo in the Mine as a ſtone, and called* Sal Petroſum ; *yea, he ſays that this* Sal Nitre *is found* White *and* Red ; *and of many Colours, inſomuch that he affirms that there are many kinds of it, not only for the diver-*

Nitre is mentioned Jeremiah 2. 22. & Prov. 25. 20. although in the Septuagint that laſt verſe is varied, yet Symmachus reads it ὥσπερ ὄξος ἐπὶ νίτρῳ, and St. Hierome follows it, and ſo does the Engliſh tranſlation.

diverſity of the colour, but becauſe there is found one that is Spongy, *viz. full of holes, another very fragile, and lamines or plates; and of many other qualities, which would be too long to talk of one by one, of which one is more* biting *and powerful than the other: of the Artificial it is not worth time to ſpeak, it being in theſe days* better known than Betony.

Truly, I thought the knowledg thereof had been *Modern.* *Prior.*

But tell me, I pray, If the *Antients* had knowledge both of the *Natural* and *Artificial Nitre*, (as you have proved by the Authority of the Antient *Naturaliſts*) did they alſo know that it *burns* ſo vigorouſly as it does? The 2 Queſtion.

Truly the Antient Naturaliſts make no mention of it, ſave only of thoſe proprieties that are found in it neceſſary to Medicine; but many other Antient Authors *do acquaint us that they knew it burn'd; for they ſerv'd themſelves of it in Compoſitions of* fire *for to burn the* Teſtudo, *or* Ram, *and the* Ellepoli, *and other* portable Towers, *which they uſed in thoſe days in taking of Cities, and alſo to burn the* Naval *powers: it is true that in ſuch Compoſitions, ſome call it by the name of the* Burning Salt, *and others the* Stone Salt, *and* Salt of Skill, *and others by the proper name of* Sal Nitri. Nicol. *Cæſarius Semienowicz.* thinks that the Antients did ſeldome or never uſe *Salt-petre* in their *Fire-works*; and that wheresoever it is found mentioned as an ingredient in the *Ignis Græcus*, &c. and that paſſage is ſpurious: at leaſt if it were uſed, it was kept as a *ſecret*: for amongſt the moſt renowned Writers of the *Roman* Wars and Militia, ne *jotta* quidem unum in illorum Commentariis de *Sale Nitri*, Nitro, aut *Sale petræ*, quod Romanorum ignibus artificialibus inſerviverint, reperiet quiſpiam. *Art. mag. p. 1. l. 2. c. 1.*

Concerning this I have another doubt, If the Antients knew that *Nitre* burnt with ſo much force, how comes it to paſs that they knew not how to make the *Powder* for *Artigliary*, of ſo great importance in Art *Military*, as well as we Moderns? *Prior.* The 3 Queſt.

The Conſequence is not good to ſay, that if the Antients knew that Sal Nitre *burned, that of neceſſity they knew how to compound the* Powder; *for that is not made of* Sal Nitre *alone: yea, it is compounded of three Materials, of* Nitre, Sulphur, *and* Coal; *and therefore it is poſſible they might have the knowledge of* Nitre, *and the Nature of it, and yet be ignorant of the Compoſition of* Powder. Nicol.

You

Prior. The 4 Queſt. You have reaſon; But for what cauſe is the *Powder* compounded of thoſe three materials? and what particular office hath every one of them? And what effect ſhall *Two* have without the *Third*?

Nicol. *The Powder is compoſed of theſe three Materials, becauſe each one doth medicate & ſupply the defects of the* two *other; for the* Sulphur *is moſt apt to kindle the* Fire *with the flame of either of the other two, which fire with flame is very apt to introduce into fire the* Sal Nitre *more than any other, becauſe the ſaid Nitre burning reſolves it ſelf into a windy Exhalation, the which is ſo potent, that it preſently quenches the flame introduced into the* Sulphur, *and conſequently that introduced (by that of the* Sulphur) *into it ſelf. For the Nature of* Sulphur, *and likewiſe of the* Nitre *is ſuch, that the flame being dead, there remains not the leaſt ſign of fire, and therefore compounding together only* Nitre *and* Sulphur *well beaten, and putting fire to it, immediately it is inflamed and deſtroyed, for the Reaſons aboveſaid, to wit, that ſuch fire will not continue until all the matter be conſumed and burned, but only a little of it, and the reſt will remain not offended by the ſaid fire: therefore to cure this defect, there is mingled with both* Coals *well powdered, becauſe* Coal *is of that Nature, that touched by the flame of fire, it is preſently kindled and converts it ſelf into fire without flame, the which fire without flame the more it is vexed by any* Wind, *ſo much the more it is enkindled and continued, until that all the ſubſtance of it be converted into* Aſhes: *and therefore touching that Compoſition with the fire, immediately the* Sulphur *is taken with flame (as is ſaid) which flame not only introduces preſently fire and flame into the* Nitre, *but alſo in the ſame inſtant introduces fire without flame into the* Coal, *which fire is not extinguiſhed, but rather augmented by the wind, and becauſe that wind cauſed by the* Nitre *is not apt to extinguiſh that fire without flame which is in the* Coal, *yea, rather, as I have ſaid, it augments it, and foraſmuch as the* Sulphur *is contiguous with the fire with flame or without flame, and cannot be without flame, the which flame (as is ſaid) in-*

So ſaith *Semicnowicz.* alſo. Si componeretur corpus quoddam ex Sulphure & ſale Nitri, optime tuſis, & ſimul mixtis, admoto igne, ſubito quidem arriperet flammam, nihilominus tamen ſubito extingueretur, id eſt, ignis ille non continuaretur, perduraretque ad conſumptionem & combuſtionem materiæ totius, ſed pauxillum tantum ex illa conſumeret, reſiduo intacto. *Art. mag. p. 1. l. 2. c. 20.*

inflames the Nitre, *and therefore these three Materials powdered and mingled well together, and fire being put to this mixture, it becomes altogether inextinguishable, until all the substance be consumed: (except there be some accidental defect in some of the materials, either of Humidity, or that there were taken of them much different from the convenient proportion) and therefore it is concluded that the office of the* sulphur *is to take hold of the fire with flame, and to introduce it into the other Materials: and that of the* Coal *is only to maintain the said fire without flame, already introduced by the* sulphur, *and chiefly against that great wind which the* Sal Nitre *causes; but then the office of the* Nitre *is only to cause that great exhalation of wind, for in that wind consists all the vertue and propriety of the Powder, for that is it which drives out the Bullet with so incredible a force, and therefore it is concluded that only on the* Nitre *doth depend all the vertue and puissance of the Powder, and the other two Materials are put therein only to resolve into* fire *and* wind *the said* Nitre, *and for no other end: for he that should compound powder only of* sulphur *and* Coal, *and charge a Gun with a considerable quantity of it, I say, giving fire to it should not be able to drive forth a stick or a straw. And this proceeds because all the expulsive vertue depends solely on the pure* Nitre, *and not of any other thing, and therefore it may be rather concluded possible to make Powder without* Coal *and* sulphur, *than without* nitre: *for it is more probable to find other Materials to do the office of* sulphur *in taking fire with flame, and likewise of the* Coal *in maintaining the fire without flame, than to find another which shall be fit to cause so great and impetuous a wind, as the* nitre *does.*

You have well assigned the cause why the powder is composed of those three Materials, and the office every one of them hath in the Composition; now I demand who was the Inventor thereof, and with what reason the proportion of each of the materials was determined by him. *Prior.*

Who was the Inventor of powder *and* Guns, *it is spread amongst the Vulgar by the Authority of* Cornazanus, *who says it was found by chance by a* Dutch Alchymist: *but I am of opinion, that* Archimedes *the* Syracusan, *that famous Philosopher and Mathematician,* Nicol. The 5 Quest.

was the Inventor of the Compoſition, and of the ſame mind is the Commentator of Vitruvius *upon the firſt Book; for of him it is written in many places (as* Valturius *ſays in his tenth Book* De re Militari*) how he found out a certain Machine of Iron, with which he threw towards a Land Army ſtones of prodigious weight and greatneſs, and with an incredible ſound; which gives us to underſtand that it was a Machine like a great* Gun, *with which he threw great Balls of ſtone (as it is not long ago, ſince the Moderns did,) and chiefly for their* great ſound, *which in diſcharging them happens, and in any other kind of Machine it does not appear to me it could be done except in one like it. True it is, that at that time it is probable they were more deformed and unhandſome than thoſe uſed at this preſent time; for the firſt Inventions are always ſomething homely, but mend with time, it being an eaſie matter to add to things already found out; and the ſame thing I ſay of* powder *which in the beginning was found out (either by* Archimedes, *or by whom you will) but was not compounded in ſuch order and proportion as at preſent is uſed. Yea, I rather judge that from that time until this, the Compoſition hath been varied many ways, and that this is true I have found in ſome Book not very Antient certain ways and Orders of compoſing it much differing from the preſent, the variety whereof I ſhall here diſtinctly ſet down:*

1 Gun-powder of the moſt antient way.

Sal Nitre	}	Each equal parts.
Sulphur		
Coal.		

2 Powder not ſo antient.

Sal Nitre	}	3 parts
Sulphur		2 parts
Coal		2 parts

3 Powder not ſo antient.

Sal Nitre	}	10 parts
Sulphur		3 parts
Coal		3 parts

Powder

4 Powder not so antient

Sal Nitre	}	12 parts
Sulphur	}	3 parts
Coal	}	2 parts

5 Powder not yet so antient.

Nitre	}	9
Sulphur	}	2 parts
Coal	}	3

6 Powder of the Moderns.

Nitre	}	4
Sulphur	}	1 parts
Coal	}	1

7 Powder more Modern.

Nitre	}	20
Sulphur	}	3 parts
Coal	}	10

8 Powder more Modern.

Nitre	}	100
Sulphur	}	10 parts
Coal	}	36

9 Powder Great after the Moderns.

Nitre	}	100
Sulphur	}	20 parts
Coal	}	37

10 Fine powder not very antient.

Nitre	}	9
Sulphur	}	3 parts
Coal of * *Mirochea*	}	6

11 Great Powder more modern.

Nitre	}	2
Sulphur	}	1 parts
Coal of willow	}	1

12 Powder of Harquebuses more Modern.

Nitre	}	3
Sulphur	}	1 parts
Coals of branches of young willows.	}	1

13 Fine powder more modern.

Nitre refined many times	}	5
Sulphur	}	1 par.
Coal of the twigs of young * *Hazel*	}	1

* Avolane

14 Great powder more modern.

Nitre refined	}	3
Sulphur	}	1 p.
Coal of Willow.	}	2

15 Middle powder more modern.

Nitre refined	}	10
Sulphur	}	2 p.
Coal of Willow	}	3

16 Powder of Harquebuses modern.

Nitre refined many times	}	10
Sulphur	}	1 p.
Coal of * *the tender branches of the Filberd or Hazel cleansed*	}	1

* The Author confesses he knows not what Mirochea is.
* Verzelle. Nizola is a filberd or a hazel Probably, Verzelle may be the shell of the Nut, but I cannot find it.

17 Gun-Powder more modern.

Nitre refined	27	
Sulphur	3	p.
Coal of the tender branches of the filberd or Hazel cleanſed.	4	

18 Gun-powder more ſtrong and modern.

Nitre refined	7	
Sulphur	1	
Coal as laſt before	1	

* Nizolaro. 19 Piſtol powder more fine and ſtrong.

Nitre many times refined	6	
Sulphur	1	parts.
Coal as before of Hazels, or Filberds	1	

20 Great powder modern.

Nitre	4	
Sulphur	1	p.
Coal of Willow	1	

21 Great powder modern.

Nitre	20	
Sulphur	4	p.
Coal of willow.	5	

22 Piſtol Powder modern.

Nitre refined the dry way	48	
Yellow Sulphur	7	parts.
* *Coals of filberd or Hazel, or Hempe-ſtalkes dryed.*	8	

23 Piſtol powder modern.

Nitre refined	18	
Sulphur	2	p.
Coal of Filberd wood	3	

Now to make any of the aforeſaid Powders, *it is neceſſary to take notice that the* nitre *be pure and potent; the which is known by the practices by burning a little; likewiſe that the* ſulphur *be clear from the earth and other filth, and that the Coal be not moiſt by ſtanding in a moiſt place, and that it be not mixt with Duſt or Earth; Laſtly, that it be well beaten, and the materials be well incorporated together: and making ſuch* powder *it will not want effects anſwerable to the kinds of it, not forgetting that it be well dried, and kept in a dry place.*

Prior. Certainly there is reaſon to wonder at the various change of the proportions, and I cannot wonder, what ſhould lead them ſo to determine them.

Nicol. *The firſt Invention (ſome believe it was by chance) I am well ſatiſ-*

ſatisfied was found by reaſon ſpeculatively; *to wit, that theſe three Materials well beaten and mingled together ſhould be apt to make a fire ſo ſtrong and unquenchable, uncil each matter ſhould be conſumed, for there are clear reaſons that it ought to be ſo, but to give the proportions of the ſaid Materials, I believe they were adviſed by* Experience; *for the firſt Order was founded upon Equality, for they took alike of each, but although it might have a good effect, nevertheleſs perceiving that effect proceeded from the* nitre, *they took a greater quantity than of each of the other, and they found that Powder more potent than the firſt, and ſo with rational advice ſome have varied the order unto this day: True it is, there are ſome orders of the afore-noted that have been ordained with* little Reaſon, *and leſs judgment; yea, I believe ſome of them, (becauſe they would not do what was done before) to ſhew their wit without any other reaſon have made new Inventions,* viz. *increaſing the* Coal *and diminiſhing the* ſulphur, *&* vice verſa, *others varying all three in ſuch ſtrange proportions that it might appear* found out *with greater* prudence *and ſubtilty.*

There are indeed a certain ſort of *Inventors* who knowing not how to ſpeak or do, but what hath been ſeen or done already by others, and are aſhamed that it ſhould appear that they have leran'd or taken any thing from thoſe went before them, do force themſelves to vary ſomething from the former manner, or the ſpeech, though it be to make it worſe than it was before.

Prior. And Tartaglia was very ſenſible that ſome of his Inventions would be invented over again.

It is a ſad truth indeed. Nicol.

You have ſhewed me how the *Order* and *Proportion* of the three materials, have been varied from time to time, now I deſire to know which of the afore-mentioned Orders you eſteem to be the beſt, that is, the moſt perfect and potent Powder? *Prior.* The 1 Queſt.

Doubt-

Nicol. *Doubtleſs that which contains the greater quantity of* nitre, *I ſay that the greater in reſpect of the whole, therefore that of the* 16 th. *Order ſhall be more potent than any of the reſt, viz. that thus compoſed,*

Thus in the Original.

Sal nitrio raffinato piu volte	}	10 *parts.*
Solfere		1 *part.*
Carbon de Verzelle de nizola giorene e monde	}	1 *part.*

Nitre refined many times	}	10
Sulphur		1 parts.
Cole of the tender branches of the Hazle or filberd young & clear.	}	1

and this ſhall be the moſt powerful for two Reaſons: the firſt is, becauſe it doth contain five ſixths of Nitre, *the which five ſixths is greater than that in any other part occurring in any of the above ſpecified Orders. The ſecond is, becauſe the* Nitre *is refined* many times, *which makes it more perfect: and there is in it alſo more perfect* Coal; *for if the* Coal *be made of a* light *and* ſoft matter, *it is more apt to receive, and more falſely to maintain the fire, and ſo ſhall be more fit and diſpoſed to do the office with celerity.*

Prior. The 7 Queſt. You have concluded the 16 *th.* Order to be the beſt powder, but I demand, if yet it ſhall not be more potent that ſhall receive a greater part, than five ſixths of *Nitre*, and a leſſer by one ſixth between the *ſulphur* and the *Coal*?

Nicol. *Without doubt it ſhall, provided that, that little part of the* ſulphur *and* Coal *be but ſufficient to do its office, which is diſcovered by taking fire with ſpeed, and alſo by introducing and maintaining it in the* Nitre *until it be wholly reſolved into fire, for if there be ſo little quantity of the* ſulphur *and* Coal *as not to do its duty, that compoſition ſhall be but unuſeful and of no value: and therefore it will behoove one to take good heed, for if it were poſſible to make good* powder *of pure* Nitre, *it would be the beſt and moſt powerful of all, but becauſe it is not apt alone to take fire with that celerity with quick flame as does the* ſulphur, *nor to conſerve it till it is all conſumed, as does the* Coal, *therefore it is neceſſary to give it the company of*

the

the other two, and in such a quantity as may be apt and sufficient to do as it ought, which may be discovered, as I told you before.

I understand you well, but is this rule general for all kind of *Artigliery?* for it is well known, that *Pistols* require finer powder than *Arquebusus*, *Arquibusus* finer than *Musquets* and *Falconets*; and *Falconets* better than other sorts of great *Artillery*: and therefore I demand whether it be not necessary to limit this composition, and fineſs according to the sorts of the *Pieces?* *Prior.* The 8 Question.

It doth appear to me so, although it be the custome, yea I have an opinion it is an error as that about your Cannon *in the* XI *Quest. of the first Book, about the length of Guns, quantity of Powder and weight of Bullets,* &c. *but I will consider better of it and make you sensible of the error in that thing.* Nicol.

☞ Of the same opinion with *Tartaglia* in this last point doth *Vannuccio Biringoccio* seem to be, in that he thus expresseth himself. *The great Artillery does require other Powder than the small, as the Gunners are pleased to say.* But the common *Experience*, as well as the authority of *Casimirus Simienowicz*, doth shew that the large grained powder, called *Cannon-powder* is not so serviceable for *small pieces*, as that which is *less*, and in *smaller grains*. Though whether the *smaller-grained powder* be not more effectual in *Cannons* than what is commonly used, I know not. certain it is that the *lesser* the *grains* are, the more *powerful* is the *Powder*: and yet, if the powder be not *grenulated* at all, but in a *subtile powder*, it loseth its efficacie, and will scarce throw the Bullet beyond the mussel of the *Gun*. These and other *curiosities* (many of which are touched upon by that learned *Lithuanian*, & by *Kircherus*; our *Virtuosi* might have taken notice of, rather than have digressed into those *impertinencies* with which he concludes his discourse of *Salt-petre*. Neither have I time to inlarge upon this Subject: nor is it my intention to carry this *animadversion* further, than to demonstrate to the meanest capacity, how ill some have written upon so *noble*, so *common*, and so necessary a Subject: and wherein they had such excellent *helps* from the *writings* of *others*, had not their *ignorance* bereaved them of those aids.

FINIS.

An additional Review.

TO the end that no exceptions may be taken againſt what I ſay in relation to the *Engliſh Liturgy* by any of the *Epiſcopal* Clergy on the one hand; or that the *Non-Conformiſts* may not derive any *further prejudice* againſt the *publique* and *eſtabliſhed* Worſhip in this Nation: I do profeſs that I neither do hereby any way derogate from the *Liturgy* of the Church of *England*, neither do I think any man can juſtly condemn Queen *Elizabeth* for the courſe *She* took herein, but rather commend her moſt *pious* prudence; what I ſay, is agreeable to what ſundry *Engliſh* Writers ſay, that juſtifie the *equitableneſs* of our *penal Laws* againſt the *Papiſts*; it is conformable to what Dr. *Heylin* writes in his Hiſtory of the Reformation *primo Elizabethæ*, and the words of Mr. *Hales* in his Sermon preached at *Pauls*-Croſs are theſe:

Mr. Hale's Sermons, *pag.* 57,58.

'And here I may not paſs by that *ſingular moderation of this* 'Church of *ours*, which ſhe moſt Chriſtianly expreſt towards 'her Adverſaries of *Rome*, here at home in her boſome above 'all the *Reformed Churches*, I have read of; for out of deſire to 'make the breach ſeem no greater, than indeed it is, and to 'hold Communion and Chriſtian fellowſhip with her ſo far 'as we poſſibly can, we have done nothing to cut off the fa'vourers of that Church. The reaſons of their love and re'ſpects to the Church of *Rome* we wiſh, but we do not com'mand them to lay down: their Lay-Brethren have all 'means of inſtruction offered them. Our *Edicts* and *Statutes* 'made for their reſtraint, are ſuch as ſerve only to awake 'them, and cauſe them to conſider the *innocencie* of that cauſe 'for *refuſal of Communion*, in which they endure as (they 'ſuppoſe) ſuch great loſſes. Thoſe who are ſent over by *them*, 'either for the retaining of the already perverted, or preven'ting others, are either return'd by *us* back again to *them*, or 'without any wrong unto their perſons, or danger of their 'lives, ſuffer an eaſie reſtraint, which only hinders them from

diſperſing

'diſperſing the poyſon they brought. And had *they* not been 'ſtickling in our *State-buſineſs*, and medling with our *Prince's* 'Crown, there had not a drop of *their Blood* fallen to the 'ground : unto our Sermons, in which the warnings of *that* 'Church are *neceſſarily* to be taxed by *us*, we do not bind their 'preſence, *only* our deſire is that they would joyn with *us* in 'thoſe *prayers* and *holy Ceremonies* which are *common to them and* '*us*. And ſo accordingly, by ſingular diſcretion was our *Ser-* 'vice-Book compiled by our *Fore-Fathers*, as containing no- 'thing that might offend *them*, as being *almoſt* meerly a *Com-* 'pendium of their own *Breviary* and *Miſſal*, ſo that *they* ſhall 'ſee *nothing* in *our Meetings*, but that they ſhall ſee done in '*their own*, though many things which are in *theirs*, here I 'grant they ſhall not finde. And here indeed is the great and 'main difference betwixt *us*: As it is in the Controverſie con- 'cerning the *Canonical Books of Scripture* : whatſoever we hold 'for *Scripture*, that even by *that Church* is maintained, only *ſhe* 'takes upon *her* to add much, which we cannot think ſafe to 'admit : ſo fares it in other points of Faith, and *Ceremony*; 'whatſoever it is *we* hold for *Faith*, ſhe holds it as far forth 'as *we* : our *Ceremonies* are taken from *Her*; only *She* over 'and above urges ſome things for *Faith*, which *we* take to be '*Error*, or at beſt but opinion, and for *Ceremony* which *we* think 'to be *ſuperſtition*: So that to participate with *us*, is, though 'not throughout, yet *in ſome good meaſure to participate with* '*that Church* : and certainly were that Spirit of *Charity* ſtir- 'ring in *them*, which ought to be, they would love and honor '*us*, even for the *reſemblance of that Church*, the beauty of which 'themſelves ſo much admire. Thus far Mr. *Hales*, with whoſe ſentiments my thoughts ſo correſpond, that to juſtifie the procedure of that renowned *Queen*, I add that *Her* action is warranted by the deportment of the *Chriſtians* from the *Apoſtolique* and *primitive* times, to the revolution under *Conſtantine*, and that I never read any thing in *Eccleſiaſtical Hiſtory* relating to *Chriſtianity*, to convince me that *Her demeanor* therein was *unlawful*, or *unexpedient*.

Where I ſpeak of the Sweating-Sickneſs, to the accounts of

Polydore Virgil and *Hollingshed*, add this out of the Chronicle of *Edw. Hall* published by *Richard Grafton Anno Domini* 1550.

In the first year of King Henry 7. *a new kind of Sickness came suddenly through the whole Region, even after the first entring of the King into this Isle, which was so sore and painful and sharp, that the like was never heard of to any mans remembrance before that time: For suddenly a deadly and burning Sweat invaded their bodies, and vexed their blood with a most ardent heat, infested the stomach and the head grievously: by the tormenting and vexation of which sickness, men were so sorely handled & so painfully pangued, that if they were laid in their bed, being not hable to suffer the importunate heat, they cast away the sheets and all the cloaths lying on the bed. If they were in their apparel and vestures, they would put off all their Garments, even to their shirts. Others were so dry that they drank the cold water to quench their importune heat and insatiable thirst. Others that could or at the least would abide the heat and stench (for indeed the Sweat had a great and strong savour) caused cloathes to be laid upon them as much as they could bear, to drive out the Sweat, if it might be. All in manner assoon as the Sweat took them, or within a short space after, yielded up their Ghost. So that of all them that sickned, there was not one amongst an hundred that escaped: Insomuch that beside the great number which deceased within the City of* London, *two Mayors successively died of the same disease within eight days, and six Aldermen. And when any person had fully and compleatly sweat 24 hours (for so long did the strength of this plague hold them) he should be then clearly delivered of his disease: yet not so clear rid of that, but that he might shortly relapse and fall again into the same evil pyt; yea, again and twice again, as many one in deed did, which after the third time died of the same. At the length by Study of Physicians and experience of the people, driven thereunto by dreadful necessity, there was a remedy invented: For they that survived, considering the extremity of the pain in them that deceased, devised by things meer contrariant, to resist and withstand the furious rage of that burning furnace, by luke-warm drink, temperate heat, and measurable cloathes. For such persons as relapsed again into the flame after the first deliverance,*

verance, observed diligently and marked such things as did them ease and comfort at their first vexation, and using the same for a remedy and medicine of their pain, adding ever somewhat thereto that was sanative and wholsome. So that if any person ever after fell sick again, he observing the regiment that amongst the people was devised could shortly help himself, and easily temper and avoid the strength and malice of the Sweat. So that after the great loss of many men, they learned a present and speedy remedy for the same disease and malady, the which is this: If a man on the day time were plagued with the Sweat, then he should strait lie down with all his cloathes and garments, and lie still the whole 24 hours. If in the night he were taken, then he should not rise out of his bed for the space of 24 hours, & so cast the cloathes off that he might in no wise provoke the sweat, but so lie temperately that the water might distil out softly of its own accord, and to abstain from all meat if he might so long sustain and suffer hunger, and to take no more drink neither hot nor cold, than will moderately quench and delay his thirsty appetite. And in this his amending, one point diligently above all other is to be observed and attended, that he never put his hand or foot out of the bed to refresh or cool himself, the which to do is no less pain than short death. So you may plainly see what remedy was by the dayly experience excogitated and invented for this strange and unknown Disease, the which at th at time vexed and grieved only the Realm of England *in every Town and Village, as it did divers times after: but 55 years after, it sailed into* Flanders *and* Germany, *where it destroyed people innumerable for lack of knowledge of the English experience.*

In the twenty second year of the aforesaid King, though the Sweating-Sickness did break out again, yet he saith that it did less hurt and displeasure to the people at this time, than it did before, by reason of the remedy which was invented by the death of many a Creature in the beginning. But in the subsequent years the Sweating-sickness is represented by him to be as direful, as others relate of it. But neither doth *Hall*, or any other *Chronologer* speak of this *famous* and *almost infallible Medicine*, what effect it had: so that we may *conclude*, that since it was *impossible* for the people to have been *ignorant* of

that *remedy* during thoſe latter *mortalities*, the *courſe* it ſelf muſt needs have been *ineffectual*.

Whereas I obſerve that the *Arcanum* of *Ivy-berryes* was no ſecret, however that Arcaniſt pretended it to be ſo; I prove it out of *Alexius Piedmontius* and others: I add to thoſe Authors *Parkenſon*'s Herbal, a Book called, *A thouſand Notable things*: and *Simon Paulli* profeſſeth he was taught it by a *Scotch* Soldier. And that it may appear with how much *more accurateneſs* the receipt is in our Medicinal Books, than in the account of Mr. *R. B.* I ſhall ſet down the words of *Alexius Piedmontius*; and that the rather, becauſe if the Receipt were ſo effectual as 'tis repreſented, (as I am ſatisfied it hath been at other times) 'tis neceſſary men ſhould know how to uſe it.

Alexius Piedmontius Secret. l. 2. pag. 92. ex verſ. Latin. Weckeri Baſileæ 1563. 'Præſentiſſimum remedium ad eos, qui 'Peſte correpti ſunt; quod valet etiam ad lividas puſtulas in 'cute ex febre peſtilentiali ſubortas: itemque ad carbunculos, 'ignem ſacrum, & id genus alia.

'R. Hederæ baccas, maturas, & in umbra ſiccatas, deinde 'contritas, & fiat pulvis, de quo accipiant ægri ʒ ſs. cum po- 'culo dimidio vini albi, deinde maneant in lecto, ut optime 'ſudent. Poſteaquam ſudaverint ægri, induſium, linteamina 'lecti, & ſtragula mutentur, ſiquidem fieri poteſt: ſin minus, 'induſium tantum cum linteaminibus. Atque ſic aliqui una 'nocte ſola ſani evaſerunt. *Mediolanenſem* quendam vidi ipſe 'Aleppæ, correptum peſte, una cum bubone in inguinibus & 'ſub axilla altero, qui cum hoc pulvere bis in die, mane ſcilicet '& veſperi uteretur: ſequenti die, bubonibus ruptis con- 'valuiſſe.

The old MSS. *Receipts* to which I refer (there is a miſtake in the year of that *Plague* in the *Print*, it being 1525. not 1540.) *Give as much as will lie on a ſix-pence (or more) in half a glaſs of white wine, and direct to cover the party well and make him ſweat*: and they add, *That ſome have taken of the ſaid powder over night, and found themſelves in the morning ſo well, that they have roſe up, cloathed themſelves, and walked about the*

houſe,

houſe, and finally been throughly cured. Probat. Ann. Domini 1625.

The *Treaſure for Engliſh men*, or Receipts publiſhed in *Th. Vicary* (pag. 245.) *Give a dram of the ſaid powder tempered with* two ounces of Planten-water, *or white wine* : and *direct the Patient to ſweat upon it as much, and as often as he can* : *and in uſing this for three or four days together, he will die or mend without all doubt (by Gods help.)* This hath been often and truly proved. The Author of *A thouſand Notable things* gives only *half a dram* with two or three ounces of *Planten-water*, and directs them to ſweat, as *Alexius* doth.

Mr. *Parkenſon* from the *Empericks, Quakſalvers*, and *Chirurgions*, expreſſeth not the doſe nor circumſtances with which it is given; but that it muſt be taken 2 or 3 days together. *R. B.* Of the uſefulneſs of Nat. Phil. par. 2. pag. 142.

Thus they, whereas Mr. *R. B.* ſays only that in the *Iriſh* Plague, the *Arcanum* which cured ſuch numbers (and which he purchaſed by the *exchange* of another *Secret*) was *only a good doſe of the powder of fully-ripe Ivy-berryes, which did uſually work plentifully by ſweat.* Here is neither an account of the *Type*, or *quality of that Plague*; (yet there is a great difference betwixt *one* and *another*, howbeit they go under *one name* : nor are they cured by one method.) No relation of the *doſe of the powder*, whether *half a dram, one, two*, or *three drams* : yet in the *plague* ſuch *ſudorifiques* as are otherwiſe uſed, are given in *double quantity* to what is commonly practiſed in *leſſer exigencies* : and though it be ſaid to *work plentifully by ſweat* ; yet is there no directions that the *patient be laid to ſweat* ; but, for all this ſaying, it might induce one that knew no more than this about *Arcanum*, to adviſe it *only* as ſuch *powders* are given frequently to continue (with other Medicines) plain *tranſpiration inſenſibly*. In ſum, there is not ſet down whether that our *Iriſh* Phyſician did begin his *Cure* with this *powder*, or with what *Method* he uſed *it* : and when all theſe *Circumſtances* are added, (without which the *Receipt* is *uſeleſs*) though I am pleaſed to have read the *happy* ſucceſs of it *once*, yet I dare not *promiſe* that it ſhall *again*, any more than Mr. *Sprats* almoſt *infallible cure of the Sweating-ſickneſs*, or thoſe other *Anti-Peſtilential Medicaments* (now *exactly*) recorded by *Experimental Galeniſts*.

Whereas (*pag.* 54.) I ſpeak of the age of *Geber*, as following

ing of *Leo Afer* in my judgment, and that he lived but one hundred years after *Mahomet*: and consequently many Centuries before *Raymund Lully*: the Argument I use is manifest to any man that knows the time of the birth of *Mahomet*, (which yet *Historians* fix to be, some *A. D.* 570. others *A. D.* 610. others in 620.) and that the *Hegyra* begins *A. D.* 622. as *Vossius*. But I think it fit that I observe here that as in all the *Arabian* Chronology, so in this particular about the age of *Geber*, there are great uncertainties. *Blancanus* placeth *Geber* (the *Arabian*) in the ninth Century after *Christ*; and so he must have lived about five hundred years before *Raymund Lully*. The inquisitive and learned *Libavius* reckons upon *Geber* as contemporary with *Mahomet*, saying, *Geberus quem volunt circa annum partûs virginei sexcentesimum in vivis fuisse*. I find that *Vigner* placeth him in the year of our Lord 723. *Ricciolus* calls him a Spaniard, *Geber Hispalensis* in his Chronicle of *Astronomers*, he placeth him in the year of our Lord 1090. and gives this reason against *Blancanus*, that it must be so, because that *Geber* in his *Astronomie* mentions *Arzachel* who lived in the *twelfth Century* after Christ, and whom by the name of *Arzael* is placed by *Blancanus* two Centuries after *Geber*, that is, within the *eleventh* Century after *Christ*. There is such a confusion in the *Arabian* names, that I am ready to imagine there were two *Gebers* (or more, the name being commonly assumed by the *Saracens*) the one *very* antient, and a *Chymist*, of whom *Leo Afer* may speak; and another in *Spain*, famous for *Astronomy*, who corrected sundry things in *Ptolomy*'s *Almagest*, of whom *Ricciolus* and others speak, who call *Geber* a *Spaniard*. As for *Raymund Lully*, whom Mr. *Henshaw* placeth in the year 1333. I find *Libavius* to say he flourished sooner: *Illustris fuit Reimundus anno salvatoris* 1324. but *Conringius* relates how he was killed in the year 1315. *Lullius* 1315. *Octuagenarius circiter, dum religionem Christianam Bugiæ in Africa doceret Martyr lapidibus obrutus est.* From whence it is manifest, that if we place *Geber* in the *twelfth* Century with *Arzachel*, (as *Ricciolus* in his larger and *more accurate* Chronicle doth) then

See Hottinger Histor. Orient.

Blancanus Chronolog. Mathemat. Secul. 18.

Andr. Libavius exam. censf. Parisiens. Vide Naudæum in histor. Magiæ, c. 14. Vide *Riccioli* Chronicon utrumque præmissum Almagesto novo.

Andr. Libav. exam. censf. Parisiens. Conring. de meteor. *Hermet.* c. 17. pag. 380.

then it is a miſtake in Mr. *Henſhaw* to ſay that *Geber* for *certain* flouriſhed *ſome Centuries* before *Raymundus Lullius* : and it *ſeems* evident that he miſtook the Age of *Lullius* alſo. So that if I grant *him* to have been a *Spaniard* (as I do not grant that *Geber* the *Chymiſt* was either a *Spaniard*, nor yet an *Indian* King, as ſome have thought) I have ſtill *juſt reaſon* to except againſt Mr. *Henſhaw*.

Where I ſay there are different *Salt-Petres*, perhaps according to the ſeveral Earths they are made: and to what I ſay about the *Salt-Petre* gathered of *Lime-walls*; add, that ſince the writing hereof I have been where a *new Cellar* yeelded me a quantity of *Peter* on the walls: I obſervedthat the taſte was rather like the *ſalt* of *calx viva*, than of *Nitre*, yet did it burn without leaving any *fixed ſalt* at all. So that if Mr. *Henſhaw*'s friend had minded that, perhaps there might have been a conſiderable improvement deduced thence, either in order to *Phyſick*, or the Manufacture of *Gunpowder*.

FINIS.

Pt. 2 & 17027 (2)
149.

THE

PLUS ULTRA

reduced to a

NON PLUS:

OR,

A SPECIMEN of some *Animadversions* upon the *PLUS ULTRA* of Mr. *Glanvill*, wherein sundry *Errors* of some *VIRTUOSI* are discovered, the Credit of the *Aristotelians* in part *Re-advanced*; and Enquiries made about

The Advantages of the *Ancient Education* in *England* above the *Novel* and *Mechanical*.
The old *Peripatetick* notion of the *Gravity of the Air*, and the *Pressure of the aëreal Columne* or *Cylinder*.
The *Deceitfulness of Telescopes*.
The *World in the Moon*, and *a Voyage thither*.
The *Original* and *Progress of Chymistry*.
The *Use of chymical Medicaments*.
The *Usefulness of the Peripatetick Philosophy* in reference to the *Practice of Physick*.

The *Original* and *Progress of Anatomy*.
The *First Inventor* of the *Circulation of the Blood*.
The *Transfusion of Blood*, the *first Proposers* and *Inventers thereof*; and its *Usefulness*.
The different *Nature of the Blood*, and the *variety* of *Phænomena* appearing upon the *burning thereof*, and *mixing* of it with *several liquors*.
Some *Trials* in order to a discovery of the *Nature of the English Baths*.

By *Henry Stubbe*, Physician at *Warwick*.

Isocrates in Encomio *Helenæ*,

Πολὺ γὰρ κρεῖττόν ἐστι περὶ τῶν χρησίμων ὀρθῶς δοξάζειν ἢ περὶ τῶν ἀχρήστων ἀκριβῶς ὁρίσασθαι. καὶ μικρὸν προέχειν ἐν τοῖς μεγάλοις ἢ πολὺ διαφέρειν ἐν τοῖς μικροῖς καὶ τοῖς μηδὲν πρὸς τὸν βίον ὠφελοῦσι.

LONDON, Printed for the Author. 1670.

A PREMONITION to the *Ingenious* and *Conſiderate* READER.

ABove a *year* ago, at the *Table* of a *Perſon of Honour*, there hapned a *Debate* concerning the *Utility of the Ancient and Eſtabliſhed Method and Medicaments uſed in Phyſick*, and *How much the knowledge of the Doctrine of Elements, Elementary Qualities and Humors*, (as vulgarly delivered) *might contribute to the skill and ſucceſsful Practice of a Judicious Phyſician?* There hapned to be preſent a *Gentleman*, very much concerned for the *Promoting of Science*, and a profeſſed Admirer of the *Inſtitution of the Royal Society*, who (as is uſual with *that ſort* of *Virtuoſi*) inſtantly uſurped all the *Diſcourſe*, and avowed that *All the Ancient Methods of Science were vain and uſeleſs to a Phyſician, and did not ſo much as contribute to the Cure of a Cut-finger.* With this *raſh* and *haſty Cenſure* I confeſs I was *ſurpriſed*, and demanding *what knowledge he had in the received Methods of Phyſick and Medicamen's?* I found *him* altogether *ignorant therein*, but ſome *crude Aſſertions* of the *new Philoſophers*, and *ſome imperfect Experimen's* were alledged in behalf of *Univerſal Inferences*, and no leſs then *Stupidity* charged upon the *precedent Philoſophers* and *Phyſicians*, with thoſe that adhered unto *them*: In fine, *He* avowed that *this opini n* of *his* was the

poſitive

positive and *dogmatical* averment even *to a syllable*, of Mr. *Glanvill* and other *Virtuosi*, and that it was *undeniably* evinced in a Book of theirs about **The Modern Improvements of Useful Knowledge**. After a brief replie to this *Insolent*, shewing that the *ancient Philosophy* had not been so *steril* in reference to *Physick*, but that *it* had been the *foundation* of all those accounts of the *Causes*, *Prognosticks*, and *Cures* of *Diseases* (as also of the *Healing* of *Cut-fingers* and *green wounds*) by which *of old* and in *latter times* Patients had been *benefited*: that the *nature* of *infirmities* had been explicated, and the *qualities* and *use of Medicaments* **successfully** explained upon **those grounds**: and whatever *Defects* there were in *those received Principles*, No Physician, *that understood what he said*, could deny *them* to be **exceeding useful**; that for *any man* to speak *otherwise*, was to expose *himself* to *just scorn* and *contempt*. As also for any man to go about to *inodiate* and *discredit* the present *authenticate Methods of Curing* upon no other exceptions *then those*, that the *Philosophy* whereupon those *Theorems* were raised was *false* and *frivolous*, was an *Intolerable Impertinence*; since that even in *Mathematicks* it was **notorious**, that *many solid Truths* had been *happily* deduced from *false suppositions* and *Postulata*; that in *Common Logick* Right *Conclusions* might be the result of *ridiculous Premisses*; and the *Rule of falshood* in *Arithmetick* would alone serve to convince any man, that upon *imaginary*, yea, *confessedly*

ſedly falſe Hypotheſes, important and *true deductions* might be *judiciouſly* continued. After that an end was put to *this conteſt* by a more *general converſation*, I ſtill retained a ſenſe of the *Injury* I ſuppoſed to be done *to me* and all *Rational Phyſicians*, by this *barbarous Opiniatour*; I determined to avenge *my Faculty* upon Mr. *Glanvill* for *this*, and by *ſa-crificing* that *Virtuoſo* to publick *Obloquy*, thereby to eſtabliſh (if poſſible) our *general repoſe* and tranquillitie, that *we* might not (as I obſerved *we* were) be troubled in *all Companies* and Aſſemblies, with *Extravagancies of this kinde*; there appearing unto me *daily* a greater *neceſſitie* of ſecuring our *Eares* with *black wooll* or *Wax*, againſt the *Buz* and *Niſe* of theſe *Prattle-boxes*, then ever *Ulyſſes* had upon his approach to the *Sirens*: Our *ruine* being as certain from *them*; and there being nothing of *Harmony* in ſuch Diſcourſes, nothing but *diſcord* and *jarring*, in compariſon whereof the *Screeching of Owls*, the *creaking of doors*, and whatever *noiſe* elſe is *offenſive*, ſeemed *Muſical* and *Melodious*. Upon the peruſal of Mr. *Glanvill*'s Book (which *He* had recommended unto me) I met with ſo much of *Ignorance*, that I wondred how *ſeveral men* ſhould *concurre* to miſtake ſo, and I thought it a *difficult* matter *to reply*, it being *too tedious* for one of ſo *little leiſure* as I have, to inform *perſons* that were *conceited* and *knew nothing*.

How-

Howsoever, *for the general benefit of the Age*, I purposed to write *some Animadversions* upon *him*, and *thereby* to put a stop to the *pride* of such *Ignoramus*'s, and amongst the several *antiquated Philosophies* which *our Times* have renewed, to *introduce* amongst the *Virtuosi* that of *Pythagoras*, the *first rudiments* whereof consisted in this, that **the Disciples were obliged for five years to hold their peace.** Upon the reading of Mr. *Glanvill*, I saw my self under a necessitie of examining the *History of the Royal Societie*, the tendencie whereof I observed to be so *pernicious*, that, if the *first provocation* had made me **angry**, I was now become **obstinate**. In that *Famed Work* I encountred with so many **illiterate passages**, that the *credit* of **our Nation** seemed concerned in the *refuting it*. I met with *Passages* so *destructive*, that, if to be concerned for the *interest* of the *present Monarchy*, the *Protestant Religion*, and the emolument of *each private person* (and not solely of *Tradesmen*) could warrant any one for *putting Pen to paper*, I *ought* not to be *silent*. I divided my *Animadversions* into *several parts*; some whereof were to represent these *Comical-Wits* as really *ridiculous*; others were to make them *odious* to the *Kingdom*. I considered, that in *these days* few had *patience* to reade over *prolixe Treatises*; as also I imagined, that the *Contest* would be more deeply imprinted in the minds of men, if they were excited by a *variety of discourse* of *that nature*. The first *Specimen of Animadversions* upon Dr. *Sprat* and Mr. *Glanvill* were dispatched last

Easter;

Eaſter; but the *Comical Wits* were ſo *alarmed* at what they at firſt *deſpiſed*, that they emploied all their *Artifices* to divert *me*: and if *malicious threats* or other *diſingenious proceedings* could have wrought upon me, the thing had *died*: But thoſe *pitiful Mechaniciens* underſtood not the weakneſs of *ſuch* Batteries *upon me*, and in all my *life* (which thoſe *mean ſpirits* pretended *they would write*) I am ſure there was never *any circumſtance* could induce *them* to conjecture that *I* was to be diſcouraged by *Menaces*; Beſides, having found them ſo *ungenerous*, I concluded it more *unſafe* to *deſiſt*, then to *proceed*: I knew the *cruelty of Cowards*, and that who had to do with *wolves*, muſt not make himſelf a *Sheep*: I evidently ſaw deſignes not only upon my *Fortunes*, but *Life*; I know the *pernicious Menacy* of *mean* and *proud ſpirits*, the *Obligation* would be loſt in *ſparing them*; whilſt the *Ignominy* was ſo *great*, to be *at my Mercy*: I concluded that the moſt *daring Council* was the *beſt*; that it was no *diſparagement* for *me* to be overthrown by *power*, and that I ſhould multiply *ſhame* upon them, when it ſhould be ſaid, I fell their *Victour* and their *Martyr*. Although I had ſubmitted *thoſe papers* to the moſt *ſevere* Judgment of a *Cautious Perſon* (giving him *abſolute* liberty to diſpunge whatſoever he thought harſh, or culpable) reſolving never to look upon or *alter them* after *he* had viewed them; when they were authoriſed to the *Preſs*, and that there was no longer doubt of their *Innocency*, they containing *nothing repugnant to the Government*, *Church of England*,

of *Good Manners*, yet did some of the *Virtuosi* (notwithstanding that *they* pretended to be *desirous it should come out*, and that rather then the *Book* should meet with any obstacle *their President should licence* it) procure the *Impression* to be stopped: If this be *Generous*, if this be agreeable to that *frankness of minde* and *Philosophy* which *you* profess; O *tres-haute*, and *tres-agreeable* Comediants, I appeal to all *English* and *brave spirits*! Could any man have perswaded the world, before *this Essay*, that *you* who seem the sole *Dictatours of Wit*, and *useful Knowledge*, would have emploied your **power** against me! And that *thirty Legions* were to be called to aid *You* against a *young Countrey-Physician*, who had so long discontinued *Studies of this nature*, and had so little time to *resume them*, or *recollect his thoughts*! Pardon me, if I tell you, there is nothing **Noble** in **this** demeanour, and whatever there may be of the *Virtuoso*, there is no *Gallantry of Vertue* will give countenance to it, nor any thing that derives from the Tutour of *Alexander*. Go, procure an *Act of Parliament*, or sollicite for a *Proclamation*, that none *write* or *speak against you*; by *such means* ensure those *Triumphs* over the *ancient Education of this Kingdom*, the *two Universities*, and the *Protestant Church*, which the *Sprats* and *Glanvills* by their *Goose-quills* cannot *atchieve* for *you*. To *this* course I should willingly submit, and not envy you such *accessionals of Glory*: And as a Supplement to the *Lifes of your Worthies*, only *write them impartially*,

I give you leave to *feign* what you will concerning *Me*. Take not the advantage against *these Animadversions*, which the *Printers* miſtakes occaſioned: they are *many*, and ſince *you* were in part a *cauſe* of *them*, by *diſtracting* and *impeding* of the *publication*; and I being *abſent* could not *remedy them*, 'twill be *ignoble* to preſs upon *confeſſed errours*, ſome whereof are reduced into a *Catalogue*. As to the *incoherences* of ſome places, and the *incongruities* of the *Engliſh*, I acknowledge there are *ſundry of that kind*; but do not think my ſelf accountable *for thoſe failures*, nor for thoſe *repetitions* of things, which as I travelled came into my *memory*; ſome whereof had been ſent to *London* before. Howſoever, if *you* can *refute the ſubſtance of the Diſcourſes*, I ſhall leave it to *your prudence*, after *this declaration*, how you will manage the *controverſie*. When the other piece againſt Dr. *Sprat* will come out, is a matter I cannot well promiſe to the world: The *Virtuoſi* can beſt undertake *for that*. I have reſpited the *publication* hereof thus long, to try, if any *Letters* of mine, or *Entreaties* might prevail *with them*: I joyned alſo *Menaces* that I would **poſt them**; which *indignities* I wonder men of *To'erable Ingenuitie*, or of ſo *great arrogance* would **out-live**. And the *Theological Cenſure* being already *publick*, I found the expectation of *all men impatient* to ſee ſome of theſe *Animadverſions*.

There

There is another Treatise, shewing the *Original* of the *Colledge of Experimental Philosophers*, as *Campanella* projected *it*, and containing a *parallel* of what *He* contrived (and their *Historian* hath pursued) for the reducing of *England* and *Holland* to *Popery*: also a *Specimen* of sundry *Experiments* published by several *Virtuosi*, that are **false** or **stolne**, yet boasted of as **their proper Inventions**: together with Instances of the *danger* that all *Tradesmen* will run into by the continuance of **this Assemblie**; which to manifest further, I shall here adde a *Proposal* designed to have been tendred, and improved into an **Act**, in this last Session of *Parliament*. It was delivered by Sir P.N. to an *Honourable* Member of the *House of Commons*, and by **Him** sent unto me, adding, "In which you may see what **they drive at**, "*viz.* Instead of *Monopolizing* this or that "*particular* Trade *at a time*, once for all to "have a *Monopoly* for *all that ever should be* "*invented*.

See *Campanella* of the *Spanish Monarchy*, in English, c. 10. p. 47. c. 25. p. 157. c. 27 p. 177, 180, 181, 182, 183.

"It is proposed, that such kinde of *pre-* "*tended new Inventions* relating to *Mecha-* "*nicks*, *Trades*, or *Manufactures*, as *are* or "*shall be* offered to the *Parliament*, may by "them be referred to such *indifferent judici-* "*ous persons*, as are like to give them a *faith-* "*ful Account*, about the *Newness*, *Reality*, *Use-*

"*Uſefulneſs*, &c. of the things propoſed, "and whether they are like to anſwer the ef- "fects pretended to, and *to make Report* of "the ſame to the *Parliament*.

"And the *Royal Society* of *London* for "*Improving of Natural Knowledge*, being "already fixed into a *Corporation*, and the "*Council* of the ſaid *Society* conſiſting of 21, "being by their Conſtitution under an "*Oath*, to deal faithfully in all things be- "longing to the Truſt committed to the ſaid "*Council*: It is offered, that *ſuch things* may "be preferred to the ſaid *Council*, and they "to Report unto the *Parliament*.

They that know the *Men*, know their *meaning*: and whoſoever underſtands the Conſtitution of *our Parliaments*, is aſſured that they need not look out of *their own number* for *indifferent judicious perſons*, to inform the Houſe what the *Reality*, *Uſefulneſs*, or *Newneſs*, &c. is of *Inventions*; or ſhould the *Parliament* be at any time deſtitute of *ſuch Intelligence*, the *Council* muſt make better Reports then doth their *Hiſtorian*, or elſe it will be in vain to reſort *to them* in the Caſe. Upon the *ſame preſence*, if they once gain *this*, that *miſcellaneous Aſſembly* of **indifferentlie judicious perſons**, ſhall pretend to *detect the Frauds of Trades*; and endeavour to *recommend* to all

be-

befitting Preferments in the *University* and *elsewhere*, the *ingenious* and *learned*: and *then* affairs will be brought to a *fair pass*. But I enlarge too far, and shall only adde, that I do remit the *consideration* and *purport* o. this *Project* to the *Tradesmen* of *London*, who are better acquainted then I with the *tendency* and *consequences* hereof. Had my *Preface* to the *Animadversions* upon the *History of the R. S.* come out first, I had there shewed that it is no way *my intention* by any of *these Pieces* to detract from any Person of *Quality* or *Learning*, that is an *Honorary Member* of that *Society*, not from the *Institution* of it: I must referre my Reader to that, as containing no *ample Justification* of *me*, as also a defence of those passages in *my life*, which I apprehended most obnoxious to *their censure*. My quarrel lies only with the *Comical Wits*, who make such a *Noise* in the world, that in them *all the rest* are as it were *drown'd*, who have *deviated* from the *intentions* of the *Royal Founder*, and are so *deserted* by *sober* and *serious* men, that I make it my further *Request*, that *they* would inform us *what number of Persons are at present actual Members of the Royal Society, and which resort thither, and pay the usual Contributions*: and that in *their Transactions* there may be related what *Persons are present each Moneth*: from hence *we* shall be able to judge what *repute* they *deserve*, and what *respects* we are to pay *them*.

ER.

ERRATA.

PAge 2 Line 31 blot out *after Euclid* p. 3 l. 13 read *vetuſtiſſimas* p. 4 l. 35 r. *exactiſque* p. 5 blot out the Marginal note p 9 l. 14 r. ἐπιπλέχεια ibid l. 13 r *diaceltatoſton* ib. l. 34 r. *Methinks I already live in thoſe times when the Virtuoſi are as abſurd as that Romiſh Monk* p. 13 l. 17 r. *cryptical* p. 14 l. 22 r. *Odorde* p. 15 l 22 r. *Bagdad, Fez and Cordova* p. 17 l. 15 r *indemonſtrable* ibid. l. 31 r. *rigorous* p. 21 l. 34 r. *Savonarola* p. 22 l. penult. r *be very defective* p. 23 l. 3 r. *Anian* p. 28 in the Margin r. *Sphærice cavum* ib. l. 29 r. *none* p. 29 l. 19 r. *and thereupon, &c.* in the Marg. citation out of *Zucchius* l. 9 r. *vitiatas* p. 30 l. 26 r. *prius* p. 31 l. 2 r. *Sarſuis* p 32 l. 32 r. *conſtruximus* l. penult. r. *alids* p. 33 l. 8 r. *album* ibid. l. 17 r *apparentiam* ibid. l. 27 r. *vitrorum* ibid. l. 31 after *Teleſcopiis* adde *uſi ſunt* ibid. l. ult r. *elicis* p 38 l. 15 r. *in* p. 39 l. 5 r. *Jocantry* ib. Marg. r. *peſſum itura* p. 40 *l.* 33 r. *thorough three* p. 41 l. 20 r. ἓξ p. 47 l. 33 r. *tubis* Margin after *Diſcis* blot out the *full ſtop*, and for p. 233 r. *page* 234 p. 48. l. 33. blot out *perhaps* p 49, Margin r. Μυσήια. ib. l. 20. r. *moſt Comical Gentlemen* p. 52 l. 22 r. *natione Græcum* ib. l. 27 r. *Genere* ib. l. 31 r for *free* r. *ignorant* ib. l. ult. r. *Trallianus* p. 56 l. 25 r *utrorumque* p 57 l. 2 r *Freiſingenſis* ib. l. 13 r. *capiendis*. p. 59 l. 18. r πόα. ib. l. 20. r. ἑπιεικῶς, & θλιβείσης, & l. 21. πόα. ib. l. 31 r. *Mindezerus*. p. 60. l. 19. r. *Theophraſto* p. 62. l. 10. r. *Sandaracham* ib l. 12. r. *Thamyras*. ib. l. 14. r. *fæces vini* p. 63. l. 19. r. μεταβαλόντε. p 66. l. 2 r. *Cordus*. p. 67. l. 22. r. *aceſcat* ib. l 33. r. *tonus* p. 69 Margin r. *Billich* de ferment. ſect. 3 9 p. 67 l. 16 r. *Noricatum. Inſtitutoriam* p. 77 l. 33 r. *Alcmæus* p. 80 l. 32 r. *verſatos* p. 84 l 17 r. *Oſteologiſts* p. 88 l. 34 r. *quadrupedibus* p. 89 l. 3 r. *rentatas* ib. l 9 r. *aliter iis* p 95 r. *about* ib. l 35 r *ſubclavian* ib. l. penult. after *equals* adde *him* p. 97 l. 17 r *mediately* p. 93 l. antepen. for *who* r. *well* p. 106 l. 13 r. *alimentum* p. 113 for *indeclines* r *rude lines* ib. l. 32 r *now* p. 117 l. 8 r. *the ſame* ib. l. 13 r. *about* p 122 l. 12 adde *improſperous* before *eff. &* ib l. 19 for *and* r. *as* p. 124 l. 4 for *urine* r. *vein* p. 151 l. 20 for *them* r. *thence* ib. l. 25 r. *craſſiment* p. 153 l. 15 after *a* adde *Man* p. 154 l. 7 blot out *it* p. 155 l. 27 r. *Inſane* p. 156 l. 5 r. *dominio* p 159 l. 18 r *Delrio* p. 160 l. 29 for *or* r. *an* ib. l. 37 r. *approched* p 163 l. 6, 7, 8 blot out *which is demonſtrable from the variety of its declination and reſtitution* p. 163 l. 20 r. *Levity* p. 167 l 23 after *therefore* add *wonder* ib. l. 29 for *duo* r. *dico* p. 168 l. 6 before *were* adde *we* ib. l 9 r. *Magnenus* ib. l. 15 r *prægravata* p. 169 l. 1 r. *Marinus* ib. l. 10 r. *granis* p. 174 l. 30 r. *volatum* l. 31 for *at* r *et* p 174 l 2 r *raillery* ib. l. 4 r *ſcurrilia* ib. l. 5 before *Council* adde *Provincial* p. 175 l 27 r. *artus* p. 178 l. 1 r. *Damagetus* ib. l. 2 r. *Cortes* ib. l. 36 r. *cone* p 179 l. 13 for *Philos* r *Puls* p. 178 l. ult. r. *conſiſtence*.

These are moſt of the material *Errata* which I have had leiſure to take notice of: there are ſeveral of the *Marginal Notes* and *Citations* which are not placed oppoſite to the places they refer unto; an *underſtanding Reader* and *Adverſary* will eaſily judge thereof: and if any man take any advantages from any *probable Errata*, or ſuch like failures as my *haſte* or the *Licenſers dash* may have occaſioned, (though not taken notice of here neither have I ever ſeen all the *Sheets*) I know not how to help my ſelf if this *Premonition* avail me not.

TO THE

Reader.

THE Diſcourſe of Mr. *Glanvill*, was the firſt occaſion of my *writing* about the *Royal Society*, the provocation which it gave to *all ſorts of men*, of different *Profeſſions* were ſuch, that it might ſtir up any *publick ſpirit*, to ſupport ſo *common a cauſe*. I was ſenſible of the *injuries* he doth unto the *dead*, the *affronts* he puts upon the *living*, the *contempt* wherewith he decries that *Univerſity-Learning*, and thoſe *Studies* by which *Chriſtianity* hath been ſupported againſt the *Arrians*, the *Jews*, the *Mahometans*, and of late the *Papiſts* and *Socinians*: and which if they be relinquiſhed, I profeſs, that I think that the *Chriſtian Religion* muſt inevitably fall without the aid of a *Miracle*. It is a kind of *Apoſtacy* from the *Nicene* and *Athanaſian Creeds* to ſlight *Metaphyſicks*. The diſtinction of the *Trinity*, of *Eſſence* and *Perſonality*, the *Hypoſtatical Union* of the two Natures in our *Saviour*, and the *meritorioufneſs of his death*, (which depends *thereon*,) are undermined with *School-Divinity*; and whoſoever hath any *ſenſe* or *value* for the *benefits* we derive from *Controverſial-Divinity*, either as to the *quieting of his Conſcience*, or convincing of his *Adverſaries*, muſt deteſt this Enterpriſe of Mr. *Glanvill*. And methinks that whoſoever doth but call to mind that variety of *fooliſh Sects*, which gave the *Church* ſo much trouble in its *firſt Infancy*, and of late years, and conſiders that they had their *Original* from want of *Logick*, ſhould not condemn that *Art*, by which men argue *rightly* from *ſound Principles*. It was no leſs ſtrange to me to finde the names of *Reverend*, *Sage*, *Grave*, *Diſputer* and *Logician*, perverted into terms of *Contumely*; yet had not all thoſe Motives prevailed with me, but that he had ſo defamed the *Ancient* and *Modern Phyſicians*, until thoſe late *Innovators*, that many importuned me

to revenge *my Faculty* upon this *Insolent Man.* Besides, I had been much troubled with *impertinent discourses* of some, who to excuse their *Ignorance* in the *Prognostick* and *Therapeutick* parts of *Medicine,* indulged themselves in the vilifying all the *ancient learning* and *reading,* and asserting out of the Writings of the *Society,* the *necessity* and *conveniency* of new-*methods,* in *curing* and *abbreviating diseases.* I soon espied my advantages over Mr. *Glanvill.* But perceiving *his Defence* so complicated, with the *History* of the *Royal Society,* that I could not well meddle with the *one* without reflecting upon the *other*; I set my self to peruse *that* also, and found the *Errors* therein so *numerous* and *gross,* and the *tendency* of it so *dangerous,* that it seemed but an easie, yet *necessary work,* to the *Universities,* and all Learning, as well as the profession of *Methodical Physick,* to write against these new-fashion'd Philosophers; I remarked so many *defaults* in both books, that I was at last weary of taking notice of them, there being still *Plus ultra.* I resolve to give my Studies no further diversion in pursuing Mr. *Glanvill;* but to leave him to the scorn of some more *common Pens,* who being at the *Universities* may have more leisure then I have at present. After all this *Ostentation of Learning,* the things he talks and writes of are such, as he is utterly unacquainted with: the Authors he mentions *he* never *saw*, and all his discourse about the *Mathematicks,* and *Mathematicians*, procured him no other *acknowledgements* from a *Learned* and *Reverend Prelate,* (to whom he sent one of his Books) than a *Reprimand* for intermedling with what he understood not. Who can choose but smile when he reads how *Apuleius* improved the *Mathematicks* ~~after *Euclide*~~? who ever heard of such men as *Maximus Palanudes, Achazen* and *Orentius*? I suppose this last should have been *Orontius,* and he is so famous a Geometrician, that when Sir *H. Savill* (as I remember) was to seek for an instance of a *pitiful fellow*; this was *the man* he fixed upon; He tells us that the most *learned* men of all sorts and professions; *Mathematicians, Chymists, Physicians, Anatomists, Antiquaries,* and *Philosophers,*

Plus Ultra. pag. 23.

Page 4.

phers, make up the *Royal Society*: but one would not gueſs ſo by their *Hiſtory*! He tells us, that the former *Methods of Science* for ſo many *Centuries*, never brought the world ſo much *practical beneficial knowledge*, as would help towards the *Cure* of a *Cut Finger*, which he ſays is a *palpable Argument*, that they were *fundamental miſtakes*, and that the *way* was not *right*. Can any one that hath heard of *Podalirius* and *Machaon* in *Homer* prate thus? *Quos tamen* Homerus *non in peſtilentia, neque in variis generibus morborum aliquid attuliſſe auxilii*, ſed vulneribus tantummodo *ferro* & medicamentis *mederi ſolitos eſſe propoſuit. Ex quo apparet has partes medicinæ ſolas ab his eſſe tentatas, eaſque eſſe vetuſtatiſſimas.* Had our *Virtuoſo* but known how *Hippocrates* had writ *about Wounds* and *Ulcers*, and that *Ariſtotle* himſelf was deſcended of the line of *Æſculapius*, and that his Anceſtor *Nicomachus* was *Phyſician* to *Amyntas* King of *Macedon*, And that *Ariſtotle* alſo was a *Phyſician*, and writ ſeveral books (beſides his *Anatomy* of *Man*) in that *Science*, and was upon that *account* valued by *Alexander* the Great, as *Plutarch* ſaith. And how little the *Ancients* ſtood in need of *modern* diſcoveries and *aids* to cure *Cut Fingers*, any man may judge, that knows what *Scribonius Largus*, and *Galen* (in his books *de Compoſ. Medicam. ſec. genera*) have written: and how this laſt Author (upon Philoſophical deductions) compounds ſeveral *Medicaments* to that purpoſe. In the *Auguſtane Diſpenſatory*, to this day his *Tripharmacon*, his *Diapalma*, his *Diadictamnum*, and others are recorded. And if any thing rendred *Paracelſus* juſtly famous, it was the cure of *inveterate Ulcers*, not *green Wounds*: and that therein he did out-doe the *ancient Phyſicians*, is a queſtion, I cannot *grant*, and have not leiſure to diſpute.

Plus Ultra Pag. 7. and 8.

Corn. Celſus in Præfat.

Diog. Laert. in vita Ariſt. *Suidas* in *Nicomacho*; & *Ammonius* in vita *Ariſt.* Vide notas *Menagii* in *Diog. Laert.* l. 5.

He reckons up *Five Inſtruments* by which the *latter Ages* have improved Knowledge above *Antiquity*. "The MICRO-"SCOPE, TELESCOPE, THERMOMETER, BA-"ROMETER, and the AIR-PUMP. Some of which were "firſt invented, all of them exceedingly improved by tho "ROYAL SOCIETY. But as for the *Teleſcope*, he con-

Plus Ultra. Page 10.

'ſeſſes that to have been invented by *Metius* and *Galilæo*. Which *Confeſſion* of his, although it take from the *Society* all pretences to the *invention* thereof; yet it is unbecoming an *inquiſitive* perſon, who might upon *better Intelligence* from *Borellus*, in his book about the *Inventor of Teleſcopes*, publiſhed in 1656. He might have learned thence that *Adrianus Metius* of *Alkmaer* did not invent them, but one *Zacharias Joannides* of *Middleburgh* in *Zeland*, (though perhaps *Baptiſta Porta* had obſcurely propoſed it) and that he who may moſt juſtly come in for a ſecond ſhare in the glory of *that invention* is one *Joannes Lapreius* of the ſame Town. And whereas 'tis generally written, that *Galilæo* was the firſt who applied thoſe *tubes* to the contemplation of *Celeſtial Objects*, even that appears to be falſe, ſeeing that the firſt *Inventor*, even *Zacharias Joannides*, (together with his ſon *Joannes Zacharides*) did make uſe of them to diſcover ſeveral new *Phænomena* in the *Moon* and Heavens. Which miſtake is unpardonable in our *Virtuoſo* (and his Aſſiſtants) becauſe that a more particular Enquiry hath been made of late years *hereinto*, then ever before. The *Barometer* he allows to have been firſt invented by *Torricellius*, not to try the *gravitation* of the *Aire*, but to prove a *vacuum*; Afterwards, the different aſcent of the *Quickſilver*, being tried on the *top* and at the *bottom* of Hills in *France*, the opinion of the *riſing* of the *Quickſilver* from the preſſure of the *Air*, was introduced and illuſtrated. But neth er is the *gravitation*, or *preſſure* of the *Air*, a *new opinion*; it is as old as *Ariſtotle*, it is *his*, and he eſſayed to *weigh* the *Air*, in his book *de cœlo l.* 4. *ſect.* 29, 30, 39. He proves the *Air* to *ponderate*, becauſe *a bladder full of Air weighs heavier then one that is empty*. Concerning which *Experiment* I ſhall adde the words of *Scipi Claramontius*, that learned Writer, the truth of it having been queſtioned, "*Poſſum tamen teſtari obſervationem* Ari-
"ſtotelis *dicto faventem, fuitque diligens obſervatio, & à di-*
"*ligentiſſimo penſatore, exactuſque ſtateris & lancibus peracta,*
"*me præſente & adſiſtente, cum pluribus veritatis cupidis viris:*
"*penſitavimus ergo primum follem novum penituſque vacuum,*
"*primo ſtatera quæ ſolum unciarum differentiam indicabat, in-*
venimuſque

Brev. de vero inventr. Teleſcopii, &c.

Pecquet. Experim 2. in Diſſ Anat. p. 54. Ed Pariſ 1651.

Scipio Claramont. de univerſo l. 14. c. 3.

" *venimuſque unciarum decemnovem,& totidem reperimus eun-*
" *dem follem diligenter inflatum, & ſolo ſpiritu nulloque hu-*
" *more immiſſo: ac poſtea uſi ſumus lance, quæ ſemuncias quoque*
" *indicabat, tumque follem inflatum unciarum decemnovem &*
" *& ſemis invenimus, adeo tamen ut ibi libra in æquilibrio abſ-*
" *que tractu (ut vocant noſtri) adamuſſim permaneret: at idem*
" *vacuus non amplius in eodem ſigno ſine tractu, ſed cum tractu*
" *perſtabat. Quocirca verum dicit* Ariſtoteles. So that whether we conſider the *gravitation* of the *Aire*, or its being *weighed*, (which Mr. *Glanvill* in his *Plus ultra* thinks ſo ſtrange of, as he expreſſes, " *To have ſaid in elder Time, That* " *Mankind ſhould light upon an Invention, whereby thoſe Bodies* " *might be* weigh'd, *would certainly have appeared very* wilde " *and* extravigant; *and it will be ſo accounted for ſome time* " yet, *till men have been* longer, *and are* better *acquainted* " *with this* Inſtrument,&c.) The opinion it ſelf, and the attempt to weigh it, is *Ariſtotles*: Nor is this Diſcourſe caſually propoſed once in *Ariſtotle*; but ſundry times he avows the gravitation of the Air in his *Problems*, viz. *ſect.*11.*probl.* 45.*ſect.*21.*probl.*18. *ſect.*25.*probl.*12,13. From hence we may judge how well Mr. *Glanvill* is acquainted with the *tenets* of *Ariſtotle*, and how *well read* he is in *him* whom he condemns. He and his *Philoſophick friends* dealt only in ſome pitiful *Compendium of Phyſics*, and from thence learned that which was the opinion of *Themiſtius*, *Simplicius*, and other eminent *Peripatetics*, as if it had been the *avowed* doctrine of their *great Maſter*; and thereupon they thus deliver themſelves.

Plus Ultra p 59.c.8.

Many *Peripatetick*s (as *Claramontius*) held that the *impure* Air of our *Atmoſphear* doth *gravitate*, though they deny it as to the pure *Elemental Air.*

" *And on this occaſion*, Sir, *I obſerve the incompetency of their* " *judgments, who are Enemies to the* real Experimental Philoſo- " phy, *in that they do not (as I intimated)* at all, *or* very little, " underſtand *what they* condemn. *This I have ſome reaſon to* " *ſay, ſince in the whole* Compaſs *of my* Acquaintance, *which* " *is not very* narrow, *I profeſs I know not* one *who oppoſeth the* " Modern way, *that is not* almoſt totally unacquainted *with* " *it. And on the other ſide, upon the moſt careful turn of my* " *thoughts among my* Philoſophick friends, *I cannot light on* " one *of all thoſe that are for the* free *and* experimental proce- " dure, *but who hath been* very well *inſtructed in the* Peripatetick " doctrines,

Mr. *Glanvill*, p.122.

Pecquet. Exper. Physi. o-Math. de Vacuo. Pag. 50, &c. Paris 1651. Mersenni Phænomena Pneumat. pag. 130. Par. 1644.

"doctrines, *which they have deserted, and* most of them *much* "better *than those who are yet* zealous Contenders *for them.* I might tell our *Divine,* that the *Gravitation of the Air* seems propoſed in *Job* 28.25. *Qui fecit ventis pondus,* God is ſaid *to make weight for the winde*: indeed neither the gravitation of the *Atmoſphear,* nor the notion of *Aerial cylinders,* preſſing upon ſubjacent bodies, were any *News* in the world when the *Society* was firſt eſtabliſhed. But the *News* of the *Barometer* is ſo *pleaſant,* that I will inſert the whole paſſage.

Plus Ultra cap. 8. pag. 59.

"*But* (IV.) *The* BAROMETER *is another late* Inſtru- "ment, *very helpful to* uſeful Knowledge. *That there is* gra- "vity *even in the Air it ſelf, and that* that Element *is only* "comparatively *light, is now made evident and palpable by* "Experience, *though* Ariſtotle *and his* Schools *held a diffe-* "*rent* Theory: *And by the help of* Quickſilver *in a* Tube, *the* "*way is found to meaſure all the degrees of* Compreſſion *in the* "Atmoſphere, *and to eſtimate exactly any* acceſſion of weight, "*which the Air receives from* Winds, Clouds, *or* Vapors. "*To have ſaid in elder Times, that Mankind ſhould light upon* "*an Invention whereby thoſe bodies might be* weigh'd, *would* "*certainly have appeared very* wilde *and* extravigant; *and it* "*will be* ſo *accounted for ſome time* yet, *till men have been* "longer, *and are* better *acquainted with* this Inſtrument. *For* "*we have no reaſon to believe it ſhould have* better luck *than the* "Doctrine *of the* Circulation, *the Theory of* Antipodes, *and* "*all* great Diſcoveries *in their* firſt Propoſals. *'Tis im-* "*poſſible to perſwade ſome of the* Indians *that live near the* heats "*of the* Line, *that there is any ſuch thing as* Ice *in the World*; "*but if you talk to them of* Water *made* hard *and* conſiſtent "*by* Cold, *they'l laugh at you as a* notorious Romancer. And "thoſe will appear as *ridiculous* among the moſt of us, "who ſhall affirm it *poſſible* to determine any thing of "the *Weight* of the *Wind* or *Clouds*. *But* Experience *turns* "*the* laugh *upon the* confident incredulity *of the* Scof- "fer; *and he that will not* believe, *needs no more for* "*his* Conviction, *then the labour of a* Trial. *Let him then fill* "*a* Tube *of* Glaſs, *of ſome Feet in length, with* Quickſilver;

"*and*

" *and having ſealed one end, let him ſtop the other with his Fin-*
" *ger, and* immerge *that which is ſo ſtop'd into a veſſel of* Mer-
" cury, *the Tube being* perpendicularly *erected*; *let him then*
" *ſubſtract his Finger, and he will perceive the* Quickſilver *to*
" *deſcend from the* Tube *into the* ſubjacent veſſel, *till it comes*
" *to* 29 Digits *or thereabouts*; *there, after ſome* Vibrations,
" *it ordinarily* reſts. *The reaſon that this remainder of the*
" Mercury *doth not deſcend* alſo, *is, becauſe ſuch a* Mercurial
" Cylinder *is juſt* equiponderant *to* one *of the* incumbent At-
" moſphere *that leans upon the* Quickſilver *in the* Veſſel, *and*
" *ſo* hinders *a* further deſcent. *It is concluded therfore, That ſuch*
" *a Cylinder of the Air, as* preſſes *upon the* Mercury *in the* Veſſel
" *is of* equal weight *to about* 29 Digits *of that* ponderous Body
" *in the* Tube. *Thus it is when the* Air *is in its ordinary temper*:
" *but* Vapours, Winds, *and* Clouds *alter the* Standard; *ſo*
" *that the* Quickſilver *ſometimes* falls, *ſometimes* riſes *in the*
" *Glaſs, proportionably to the* greater *or* leſs acceſſion *of* Gra-
" vity *and* compreſſion *of the* Air *hath received from any of*
" *thoſe* alterations; *and the* Degree *of increaſe beyond the*
" Standard, *is the* meaſure *of the* additionable gravity. ——

There is ſomething ſo *charming* and ſo *divertive* in this diſcourſe, that I cannot yet diſmiſs it, notwithſtanding what I have ſaid out of *Ariſtotle* and *Claramontius*. That there is *gravity* even in the *Air* it ſelf, and that that *Element* is only *comparatively light*, was of old made evident by the *Man of Stagira*: nor did the *Schools* hold a different *tenet*, if you take *Air* for this impure mixture and *Sphæra vaporoſa* about the Earth, which we *breath*, and in a ſpecial manner have to do with: as appears from *Claramontius* in his Book of the *Univerſe*, and *Septalius* upon *Ariſtotle's Problems*. But Mr. *Glanvill* neither underſtands what *he oppoſeth*, nor what he *Aſſerts*. For in the beginning *he* ſpeaks of the gravitation of the *Element of the Air*; whereas that Inſtrument called a *Barometer* propoſeth only a way to meaſure the degrees of compreſſion in the *Atmoſphear*, in which Region I believe no man ever denied but that the *Aqueous* and *Terreſtrial* corpuſcles interſperſed had their *weight* and *preſſure*: Thus the ordinary temper of *this Air* (which is never pure) the al-

Averroes adheres to *Ariſtotle*, and holds the Air to gravitate.

 terations

terations of it by *vapors, winds*, and *clouds*, are the ſubject of thoſe contemplations, as any man knows that reads Mr. *Boyle*, or even Mr. *Glanvill*. Thus all the flouriſh of *Rhetorick* comes to nothing, the *wonder* is ceaſed, and we come to try only a more particular way of examining the weight of a *body*, which no man *in his wits* ever denied to be *ponderous*. And here I muſt tell our *Virtuoſo*, that his *reading* or *conſideration* extends not ſo far as to the writings of Mr. *Boyle*, and the experiment in him. For it appears out of *Him* that the *Mercurial Cylinder* riſeth and falls in the *Magdeburgical* Air-Pump, according to the leſſening or vigorating of the *Spring of the Air*: and that upon putting in the *Barometer*, "and cloſing the *Engine*, there appeared not any change in "the height of the *Mercurial Cylinder*, no more then if the "interpoſed *Glaſs-Receiver* did not hinder the immediate "preſſure of the ambient *Atmoſphear* upon the incloſed *Air*; which hereby appears to bear upon the Mercury, rather by vertue of its *Spring* then of its *weight*. And if this *Phanomenon* proved ſuch in a *greater* and *leſs Receiver*, with a *greater* or *leſs* cylinder of *Mercury* (it being indifferent which is uſed,) I doubt this *Barometer* will not *determine* the ſtrength of the *Spring* of the *Air*, much leſs its *weight*. For the *Elaſticity* is a diſtinct conſideration from the *weight* of the *Air*: as when ſome *Experimentators* went about to weigh the *Pike*, the *Flownce* or *Spring of the Pike* was no part of the weight of the *Pike*, though it might turn the *Scales*. This ſole conſideration deſtroys all the great promiſes we have from the *Barometer*, for if the *Spring of the Air* cannot be *exactly* known, that we muſt be *for ever ignorant* of the nature of thoſe other bodies which *influence* and *preſs* upon our *Air*, and compreſs the *Spring* of the *Air*, and may have many *operations* upon it which we know not, neither can comprehend; If the *height* of the *Atmoſphear cannot be determined*, (which I make a *poſtulatum* of) the *alterations* in the *higher Regions* are unſearchable, and the *mechaniſmes* of thoſe *corpuſcular combinations* incomprehenſible, I ſhall not donbt to ſay, that there is not yet found out a way to meaſure *ALL THE degrees of Compreſſion in the Atmoſphear*: nay, 'tis far from

Experim. Phyſico-Mechan. Exper. 17.

Beſides, the difference in *Quickſilver* is ſuch, that all Writers take notice of it, and I am apt to believe the *Phenomenon* may be much varyed in the *Cylinder*, according to that.

from that *exactneſs*; for the body of the *Quickſilver* varies not upon *inſenſible* variations in the *Air*: the *intercepted Air* in it takes off from the *Niceneſſe* of the *Experiment*: and ſince even *heat*, (and perhaps other circumſtances) adds to the *Spring of the Air*, it cannot give us *that* account *pretended*, about *vapours*, *winds* and *clouds*.

The *Eſſay* by *Tubes* and *Quickſilver*, as ingenious as it is, yields the *Society* no further *glory*, then to have illuſtrated it, and perhaps to have made ſome *further Experiments* in it then thoſe had done, to *whom*, as the *firſt Inventor*, (by the conceſſion of the *Hiſtorian*) appertains all or moſt of the Honour which ariſeth from *ſuch acceſſionals*. It is true, our *Virtuoſi* fixed on it the name of *Barometer*, but they had done better to have called τὸ ἔ ἔνεκα, or εὐτολέκεια, or *Gas*, or *Blas*, or *Diaceltateſton*, or ſome ſuch *unintelligible name*, rather then have termed it thus: the *Appellation* ſignifying no more *an inſtrument to meaſure the gravity of the Air*, then *an inſtrument to weigh a parcel of Tarre*, or indefinitely *a pair of Stillyards*. The *Aerometer* might have been a little more *Emphatical*; eſpecially conſidering that ἀερομετρεῖν and ἀδολεχεῖν are *Synonimous*. Had not *Aeroſcopium* been accommodated to the *Thermometer*, it would not have been *much incongruous*. But I conceive, that *Aerobaricon* or *Aeroſtaticon* would have fitted the *Experiment* as well as any *name* I can now think upon. The *Barometer* was invented by *Torricellius* to prove a *Vacuum*, and in *Merſennus's Cogitata Phyſico-Mathematica*, you may find it applied to the examining the difference of the *Air* in ſeveral places. The Air Pump was found out at *Magdeburgh*, and not in *England*; it was firſt publiſhed by *Schottus*, under the name of *Inſtrumentum Magdeburgicum*. Mr. *Boyle* amended it, and proſecuted many *ingenious Experiments* in it, for which all Philoſophers are redevable to *him*, but cannot proclaim him the *Inventor* of the *Inſtrument*, no, nor of the (notion of the *Elaſticity of the Air*, which was propoſed firſt to the world by *Henricus Regius*, under the name of the *ſpontaneous dilatation of the Air*: and illuſtrated by *Pecquetus*, who firſt, (that I know of,) ſpoke of the *Elater*, *Pecquetus pag.* 49 (*quem elaterem nuncupo*)

Hen. Reg. *Philoſ Nat. l.* 2 *c.* 12. *p.* 4. & *l.* 2 *c.* 3 *p.* 173 *ed.* 1661.

Forel *ubi supra* c.12. p.26. Blancanus *de mundi fabr. part.* 3. c 2.

nuncupo). The *Microscope* was invented by the aforesaid *Zacharias Joannides*: The *Thermometer*, or *Thermoscopium* was first the invention of *Sanctorius*; so *Blancanus* saith, *Audivi Doctorem quendam medicum Patavii degentem, qui* Sanctorius *cognominatur, hujus esse* inventorem And now I demand of our *Virtuoso*, which of these *Five Instruments for the Improvement of knowledge* have been found out by the *Royal Society*: The *Thermometer* is the discovery of a *Galenical* Physician; but as to our *Virtuosi* nothing appears but the *pretension to other mens discoveries*, and the *improving* of them.

By the Benefit indeed of *one* of these *Instruments*, the *Te-*
"*lescope*, we are put in hopes to find a sure way to deter-
"mine those *mighty Questions*, Whether the *Earth move*?
"or, The *Planets* be *inhabited*? And who knows which way
"the *Conclusion* may fall? — I perceive hereby that Mr. *Glanvill* is not *altogether* convinced that the *Earth moves*; and I am as little satisfied, that the solution of *those Questions* is so *mighty* and important a thing; for if the *Earth* stand still, then things will be as *they are* now: and if it be *determined otherwise*, yet shall we not need to fear that the *Revolution of the Earth* in its *Diurnal motion*, either shake *our houses about our ears*, or shake us off by the *tangent line*: and as for those *inhabitants of the Planets*, in case all our other *trading* should be lost, we shall not finde *out* any *gainful commerce* with *them*; nor need we dread that they will *piss out our Eyes* as we look up. So that let their Telescopes be brought to that *unimaginable* perfection, whereby to discover the *inhabitants of the Planets* as plainly as *mites in Cheese*, and let the *Conclusion* fall which way it will, things will fall out no otherwise than they do.

He inveigheth bitterly against *Aristotle* for his *Heathen-Notions*, and in his Preface to the Clergy of *B.* & *W.* wishes that the devoted Admirers of *Aristotle* would study his *Rhetorick*, *History of Animals*, and *Mechanicks*. I wonder he did not recommend unto them the perusal of his *Ethicks*. Certainly they deserve as much to be read *in these days*, as any Piece.

And

And perhaps his *Politicks* might contribute ſomething to the inſtruction of a *Nation*. But how dare he recommend any book of that man of *Stagira* to be read, if thoſe motives that ſwayed him to *Anti-Ariſtoteliſm*, be of any *validity*: Alas! he is troubled at his *Heathen-Notions*! Oh! rare *Puritaniſm*! But my dear Brother *Scruple*, ought any one to be offended at every thing that is of *Heathen-Original*, though it contain nothing of *Gentiliſme* in it? Repreſent your adverſary as you pleaſe to his *Dioceſan*, nothing hath more of the *Presbyterian* and *Fanatick* then this *Topick*. Moreover, what do you think of thoſe *Atoms* and *Corpuſcles*? are they not *Heathen-Notions*, and decried by the *Fathers*? what do you think of the terms uſed by the *Mathematicians*? what of the *Langnages*, ſuch as are not *Sacred*? what of the months, days of the year, and the names of the *Stars*, *Conſtellations*, *&c.* Muſt every thing be reformed according to the *Cœlum Stellatum Chriſtianum* of *Julius Schillerus*? Beſides, theſe words in *Theology*, of *Unity* and *Trinity*, have as much of *Heatheniſm* in them, as they have of *Platoniſm*. I ſhall here take further notice of his *exceptions* againſt *Ariſtotle*, as they are Recapitulated here (though they are more largely propoſed by him in his *Letter* againſt *Ariſtotle*, which I have fully anſwered in a diſtinct Treatiſe) the *generall cenſure* whereof is, That they are nothing but *Lies*, and ſuch as no man that is acquainted with any thing of *ancient Literature* could have uttered. I proteſt in *the Preſence of Almighty God*, that if there be not great care taken, we may be in a little time reduced to that paſs, as to believe the ſtory of *Tom Thumb*, and all the *Legends* or *falſifications of Hiſtory*, which the *Papiſts* obtrude upon us! This Philoſophy fairly diſpoſeth us thereunto, by taking us off from the *Pedantiſm* of *Philology*, and *ancient reading*, and by accuſtoming us to believe the *forgeries* they obtrude upon us. Methinks herein he is one as abſurd as that *Romiſh Monk* was in the Pulpit. *Heresbachius* I. C citante Tarbmanno, *audivi*, inquit, *Monachum in Eccleſia declamantem, qui, nova, inquiebat, jam reperta eſt Lingua, quæ vocatur Græca; ab hac ſedulò cavendum: Hæc enim eſt quæ parit omnes*

Jo. Hen. Hottingerus in Smegm. Orientali. l. 1. c. 2. p. 2.

omnes iſtas heræſes. Ea lingua eſt liber proditus, in manibus paſſim habetur & vocatur N. 1. *Plenus hic liber rubetis, & viperis. Alia etiam oritur lingua, quam vocant Hebræam, hanc qui diſcunt, efficiuntur Hebræi.* We are running on as faſt as we can to this condition of *ignorance*, and ſhall be ſo inured to *Hiſtorical* untruths, *magiſterially* impoſed upon us, and diſuſed from inquiring into *them*, as to *beleeve any thing*. He tells us the *Ariſtotelian* Philoſophy aims at *no more*, than the inſtructing men in *Notion* and *Diſpute*, that its *Deſign* was mean, and its *Principles* at the beſt uncertain and precarious,—— One may gueſs how well our *Virtuoſo* underſtands the *Old Philoſophy*, to aſcribe that unto it all in general as *its aim*, which is but the intendment (and that a neceſſary one too) of the *Dialectick* and *Metaphyſical* parts. In *Natural Philoſophy* their deſigns were the ſame that our *Moderns* boaſt of, if they miſcarried in the *main*, let us pity their misfortunes, but not blame their *intentions*. Did *Ariſtotle* in his books of *Animals*, or *Theophraſtus* about *Plants*, inſtruct men only to *Diſpute*? Had his *Anatomy*, and his *Problems* nothing but Notion? Muſt we caſt off all *Notions*? Or ought we to endeavour after the gaining of *clear notions of things*? If men hitherto did proceed no further, and yet pretended to be *Peripateticks*, blame the *abuſe*, but condemn not the *Philoſophy*, which hath nothing in it that puts a ſtop to *Enquiries* and *Curioſity*. Nor do I find that thoſe *Phyſicians*, and others, who advanced the ſeveral parts of *Natural Philoſophy* and *Phyſick*, did thereby act contrary to the rules of their *Maſter* or *Tutors*. It is true, that their *Schools* did meddle but with *few points* mainly, and thoſe were ſuch as related to *Divinity*, as *the Eternity of the World*, *the Nature of the Firſt and Second Cauſes*, of the *Soul and its Faculties*, *&c.* as to an exact *natural Philoſophy*, they did not much trouble themſelves, nor had we had what we have, but that *Averroes* and the *Phyſicians* befriended us. But muſt *Scaliger* and ſuch like ſuffer under theſe *Imputations*, which particularly relate unto their *School-Divines*? and muſt *they* alſo be blamed for not teaching nor putting men upon *further Enquiries* than were neceſſary to that *Chriſtianity*, which they were

to

to ſupport againſt the *Mahometans* and *Jews*? He that knows the end of *their* firſt inſtitution by *Charlemaigne*, can beſt judge how *prudential* it was, and how they anſwered *expectation*. But our *Illiterati* know nothing of *that*, and are always reviling *them* where they are not *faulty*, and would have had them neglected that part which was *neceſſary* to the *Education* of all that were to live *under* and *ſupport Chriſtianity*, to purſue *Studies* that contribute *little* thereto, and ſuch as were never *eſſential* to the being of a *State*, but have been often *exploded* as *prejudicial thereunto*. The ſame *Apology* may ſerve the preſent *Univerſities*, who do enough in breeding up men to be fitly qualified for *Employments* in *Church* and *State*, and inſtruct them in ſo much *Philoſophy* as is neceſſary for the explaining and defending of our Religion againſt *Atheiſts*, *Papiſts*, and *Socinians*: and whoſoever ſhall put the *accurate debate* of *theſe Points*, *the Art of reaſoning*, *the Validity of Conſequences*, *the unfolding of crytical Syllogiſms and Fallacies*, *the general doctrine of Topicks*, the *Moral Philoſophy*, and *Foundations of Civil Prudence*, (beſides *Civil* and *Eccleſiaſtical Hiſtory* and *Languages*) which are taught there, or ought to be by their *Conſtitution*, into the *Scales* on one hand, and the *Mechanical Education* (recommended with all the advantages that ariſeth from *Aphoriſms of Cider*, *planting of Orchards*, *making of Optick Glaſſes*, *magnetick* and *hortulane Curioſities*) on the other hand, will be able to judge eaſily which *Studies* deſerve the *moſt encouragement* by the *publick*, and which are moſt *uſeful* and requiſite. Having ſaid thus much in behalf of our *Univerſity-Learning* (which is now *contradiſtinguiſhed* from the *Mechanical Education*) I ſhall adde thus much in favour of our *Anceſtors*, who gave ſolemn encouragement to *Archery*, *Cudgel-playing*, *Foot-ball-playing*, and other *Exerciſes*, that prepared the Vulgar to *Military Performances*; as the more *Academical* did the *Gentry* to *State-affairs*: whereas they gave little countenance to the *Experimental Philoſophers* and *Naturaliſts*: that the practice is juſtified by *Vegetius* l. 3. c. 10. *Quis autem dubitat artem bellicam rebus omnibus eſſe potiorem, per quam libertas retinetur, & dignitas propagatur, provinciæ conſervantur &*

See Mr *Sprat*, p. 329.

Imperium

Imperium? *Hanc quondam relictis dextrinis omnibus* Lacedemonii, *& post colucre* Romani. *Hanc solam hodieque* Barbari *putant esse servandam: cætera aut in hac arte consistere, aut per hanc artem assequi se posse confidunt. Hæc dimicaturis est necessaria, per quam vitam retineant & victoriam consequantur.* But to return to our *Virtuoso*! Are not the principles of *Des Cartes*, and the *figured Atoms* of *Gassendus* as *precarious* as those of *Aristotle*, and less subjected to *sense*? Have not the *Chymical Principles* so much of *uncertainty*, as they have of *Equivocation*? Are not they *precarious* too, and suspicious? Are there any of *those* that agree amongst *themselves*? and do not they as little agree with *Nature* as those of the *Peripatetick way*? I will not doubt to maintain that as far as *Physick* is concerned in the debates; The ancient *Philosophy* better agrees with the *Phænomena* of *Nature*, and carries us on with more assurance to *work* (as they phrase it) then any other, and that the diligent reading of *Vallesius*, *Mercatus*, *Saxonia*, *Claudinus*, *&c.* shall produce better Physicians then *Sylvius*, *Helmont*, or *Odorode*. And whosoever resolves any of the other Questions in the *Negative*, whatever he *pretend*, hath never considerately studied the *Points*. Give therefore the *Aristotelians* leave to hold an *Hypothesis*, which is accommodated to the *polity* of our *Nation*) at least as *revocable*, till a better be *introduced*; and do not proceed in an exterminative way, till something else be ready to be *substituted*.

Analogicè si accipiantur hæc Chymicorum principia assentiri eis possumus, ita ut pro *Mercurio* ponatur *aqua*, *Sulphure ignis & aer*, *Sale terra*. Analogiâ negata negatur omnia coabire. Ex aqua & terra fac *limum* viscidum, & hunc cuta conglutinari & concrescere in lapidem: quemadmodum naturâ id fieri videmus. Si huc resolvatur in ultima non in *Mercurium*, *Sulphur*, & *Salem*, sed in vulgata & Physica resolvetur principia. *M. Ruland. Progymn. Alchym Qu.* 6.

If Notions might be rejected for being first proposed and used by *Heathens*, then is not *Aristotle* in a worse condition then *Epicurus*, *Democritus*, *Plato*, or *Pythagoras*; *If Impiety* in the *Teacher* may authorize us to reject doctrines *not impious*, I think the condition of our *Stagirite* not to be worse then that of other ancient *Philosophers*, and better then some of the *New*. That there is *impiety* enough in *Gassendus*'s Answer to *Des Cartes*, any *Christian* will grant, especially if he be a *Protestant*. And the life of *Des-Cartes* had

had but little of the *Saint*: this is manifeſt. And I deſire Mr. *Glanvill* to acquit *Paracelſus* from being *impious* in his *life*, and many of his *doctrines*. If he was a *Corrupter* of the *Wiſdom* of the *Ancients*, for *miſ-citing*, and miſrepreſenting *their* opinions; and muſt therefore be condemned and rejected: who can approve of Mr. *Sprat*, Mr. *Glanvill*, and their *Adherents*? He ſaith, that *Ariſtotle was of no ſuch ſuperlative Account in the wiſeſt times*. But he tells us not which thoſe *moſt wiſe times were*, when he was in *diſeſteem*. I have not read of any more wiſe people, then *Greece*, *Rome*, and the *Mahometans*, under their firſt *Caliphs* and King *Almanſor*. And yet all theſe admired him at ſeveral times. He that chargeth *Philip* of *Macedon*, *Alexander* the Great, and his Succeſſors, (particularly the *Ptolomyes* of *Egypt*,) with *Folly*: and *Sylla*, *Tully*, and thoſe other *Romans* that admired him, with want of *wiſdom*; Or, who thinks that the *Empire* of the *Moors*, and their *Academies* at *Bagdod*, *Fez*, and *Cordula*, were compoſed of a ſort of *Simpletons*, may go ſeek for the *wiſe* and the *prudent* in *Gotam Colledge*. And perhaps thoſe *Chriſtians* that celebrated *Ariſtotle*, and advanced him to that *repute* in their *Kingdoms* and *Univerſities*, were not *Idiots* or *Changlings*. That *He was much oppoſed and ſlighted by the firſt Fathers*, is an Objection that hath ſome truth in it, but not much to the *particular* prejudice of our *Stagirite*. For at firſt they hated and deteſted all *humane Learning*, and *Philoſophy*; and when they came any of them to admit of thoſe *Sciences*, then they divided into the *Ariſtotelians* and *Platoniſts*, as they did into *Arians* and *Catholicks*: That the *Arians* were *Ariſtotelians*, is to me as evident, as that *Mahomet* taking the advantage of that *faction*, and of the *brutal lives* and *ignorance* of the *Catholiques* depending upon the *Patriarch* of *Conſtantinople*, did advance the Sect of *Chriſtians*, called *Mahometans*; and *his* Succeſſors the *Caliphs*, did wholly

I cannot finde any ground to conclude *Ariſtotle* ſo wicked. If we indemnifie him for having an hand in poiſoning *Alexander*, (which perhaps is not true). In his *laſt Will*, there is much *generoſity*: in his *life*, many teſtimonies of a *ſingular* vertue: in his diſcourſes much *wit* and *worth*. He writ an *Apologie for Piety*; got the walls of his deſtroyed Country to be *rebuilt*, and made excellent *Laws* for it. *Philip* choſe him to breed up *Alexander*. And thoſe are greater aſſurances that he was not ſo wicked, as he is reported by his adverſaries. They repeat nothing but old lies, ſuch as *Apellicon* refuted: and *Ariſtocles* ſaith, προδηλων πεπλασαι. See *Caſaubon* upon *Diog. Lart.*

wholly employ themſelves to improve the doctrines of *Ariſtotle* and the *Peripateticks*. So that *Ariſtoteliſm*, *Arianiſm*, and *Mahometaniſm* iſſued out of the ſame parts of the world, *viz.* *Alexandria*, and the adjacent Countreys: Nor was it *Chance* or the *black ignorance of the Age*, but great *prudence* in *Charlemaine* and his Succeſſors in the *Weſt*, that brought in *Ariſtotle*: as any man will ſay that underſtands the circumſtances of thoſe dayes. But ſo much Hiſtory is above the reach of my *Experimental Philoſopher*: To ſupply *that* defect, *Chriſtians* muſt be *once more* told, that *ſince their minds are enlightned with the rays of the glorious Goſpel, they have leſs reaſon to bow down to the Dictates of an Idolater and an Heathen.* And ſo *farewel* to the *Rhetorick* and other works of *Ariſtotle*, which our *Virtuoſo* a little while agoe recommended unto us. Let us ſhake hands with *Seneca*, and *Epictetus*, and *Plato*: and joyn with *Tertullian* in that ſaying, *Nobis Philoſophia opus non eſt poſt Jeſum Chriſtum, nec Ariſtotele poſt Evangelium.* Having ſaid thus much to theſe *grand accuſations* againſt *Ariſtotle*, with which Mr. *Glanvill* was ſo perplexed, I ſuppoſe he may think that a more *devout Admirer* of *Ariſtotle* then I am, with more time, may ſay enough to convince him, that it was his fault, and not the *Peripateticks*, that he benefited ſo little by them. And I pray what language did *Epicurus*, *Pythagoras*, and *Philolaus* make uſe of? *He* writ better about *divine* things than *Plato*, as *Voſſius* witneſſeth, *Quanquam multa de Deo ſcripta ſunt a* Platone, *accuratius tamen apertiuſque de iis egit* Ariſtoteles. He cites a paſſage of *Plato*, ὁ θεὸς γεομετρεῖ, and adds, that the *Univerſe* muſt be known by the *Art*, by which it was made. If it be not to be known any other way, it is unintelligible. Let him anſwer Dr. *More*'s Dialogues upon that point, where he explodes the *Mechaniſm of Nature*: and reckons upon *Des-Cartes* as the moſt *prodigious Fool* that ever was, for holding that opinion. I ſhall adde, that *Geometricians*

I deſire that the *Virtuoſi* would enquire after the *Peripatetick* Philoſophy, at *Alexandria* after the *Ptolomies* and not at *Athens*. And when they have done that, and ſtudied the condition of *Chriſtianity*, during the time of the *Arrians*, and enquired into the riſe of *Mahomet*, the circumſtances that advanced *him*, and contributed to the ſpreading of *his doctrine*, and increaſe of that Empire under the *Caliphs*, then they will be able to judge of the truth of what their *Hiſtorian*, and Mr *Glanvill* writes in the books *animadverted on*, and in his Letter concerning *Ariſtotle*.

tricians are commonly a ſort of men, that being once got out of *their Science*, they are far from being elevated and improved thereby: And the reaſon is, becauſe that the ſevere procedure of *Mathematical demonſtrations*, and *their* ways they take to demonſtrate things appertaining to *their Science*, theſe do not qualifie a man *at all* for thoſe *argumentations* which ſway and guide in *Metaphyſicks*, *Ethicks*, *Politicks* and *Religion* it ſelf. Upon this account *Ariſtotle* obſerved, that a *child* might become a *Mathematician*, but not a *Politician*, or *Moraliſt*. Hence it is, that *Geometricians*, (except their ſtudies have particularly acquainted them with thoſe *Dialectick*s, which regulate the *generality* of Mankinde in *ſuch diſcourſes*,) ſeldom, if ever, prove *Metaphyſicians*, *Religieuſe*, or otherwiſe of *tolerable ratiocination*: either rejecting as *falſe*, *frivolous*, and *indemonſtrable*, thoſe *reaſonings* and *ſtudies*, according to which *humane affairs* are regulated; or elſe *ignorantly*, running into *Whimſeys*, and *phantaſtical ways of arguing*. Neither is this more manifeſt, then I think theſe *two Concluſions* are, which I deduce from *thence* in oppoſition to ſome *Comical Wits* in their *Hiſtory*, viz.

Ariſt. Eth. l. 6. c. 8.

That by how much more *general* as to *publike* and *private uſe* and *emolument* in order to *domeſtick* affairs, or *Civil Prudence* and the preſervation of *Humane Society* and *Government* thoſe things are, which depend upon *perſwaſive Arguments*, and thoſe *topicks* and methods of *ratiocination* which are laid down by *Ariſtotle*, not *Euclide*: by ſo much thoſe *courſes* ought to be *purſued*, *upheld* and *encouraged* by underſtanding *Stateſmen* which are *ſubſervient thereunto*, above the *leſs neceſſary* and *inutile Mathematicks*.

Next, That the *Mechanical Education*, or that whereby Youth are inured at firſt to *vigorous demonſtrations, and neceſſary deductions from evident Principles*, and a *Philoſophy* that is purely *Corpuſcularian*, ought not to be premiſed or preferred to *other ſtudies* in order to the fitting men for *humane life*: ſeeing either *accidentally*, (yet ſo, as in regard of our *depraved nature* it is almoſt *unavoidable*) or *intrinſecally* thoſe *courſes* diſpoſe mens minds afterwards to *Atheiſm*, or an *indifference* in *Religion*, and *inhabilitate* them towards thoſe *more*

Hiſt. of the R. S. p. 349.

important, but *less delightful studies* of *Law*, *Policy*, and *Religion*, with their *several dependencies*.

I finde that *Aristotle* hath complained of some, that in their Explications of Nature made too much use of *Geometry*. *Magnenus* hath complained also of them; and *Conringius*, *Bullialdus*, and *Ricciolus*, of *Kepler*; and *Bodinus*, in his *Theatrum Naturæ l.5.* and all *Physicians* almost of *Des-Cartes* his ridiculous book *de Homine*. And if *Plato* was so solicitous, that none but *Geometricians* should come into his *School*, yet he sent them very *fools* out, if they allowed of his *Logick* and *Physiology*. I shall leave the further defence of *Aristotle* to others; only I must tell him, that *Vossius* in his account of *Geometricians* allows of *Aristotle* for *no mean one*. And we find that he supposeth his *Scholars* not ignorant in *Geometry*, since without that knowledge they could not understand his *Analyticks*, nor that part of his *Ethicks*, where he illustrates *Justice* by the *Arithmetical* and *Geometrical proportions*. And as for his *Ethnical opinions*, it is ridiculous to upbraid the *University-Learning* with them, since they are not taught, but *solidly refuted* there, However if *Aristotle* must suffer on this Account, let not *Epicurus* triumph. He tells us that *Archytas*, that great Geometrician was scared from *Mechanical* and *Organical Methods* to the *great hinderance of beneficial Improvements that way, so that he kept himself up in Abstractive Contemplations*. I cannot finde any such thing in his life written by *Diog. Laertius*, but the contrary, ὅτ☉ πρω῀☉ τὰ μηχανικὰ ταῖς μηχανιχαῖς πε῀οχρησάμεν☉ ἀρχαῖς ἐμεθώδευσε, κὴ πρῶτ☉ κινησιν ὀργανικὴν διαγε῀άμματα γεωμε῀ρικῷ πε῀οσήγαγε. He made a Pidgeon of wood *artificially* to flie. So *Favorinus*. Ἀρχύτας τα῀αντῖν☉ φιλόσοφ☉ ἅμα κὴ μηχανικὸς ὢν, ἐποιησε πε῀ιστε῀ὰν ξυλίνην, πε῀ομένην ὅτις ἔιπο῀ε καθίσειεν, ἐκέτι ἀνίστατο. I wonder oftentimes how He did to commit so *many mistakes*; and I cannot believe that He or his *Philosophick friends* were ever well instructed in the *Peripatetick doctrines*, who are so ill taught in all manner of *Humane Learning*. I resign him up to

Vide *Ricciolum* in *Almagest. nov.* l. 4. p 278.

See Mr. *Parkers* censure of the *Platonick Philosophy*.

Vide *Blancanum* in loca Mathematica *Aristotelis*.

Epicurus Matheſin insuper habuit: unde ut *Plutarch.* ait libro *contra Epicurum*. Philosophum quendam nomine Apellem, eo nomine laudabat, quod ab adolescentia nunquam esset contaminatus disciplinis Mathematicis. *Vossius de Philos. S. c 8 sect. 7.*

Diog. Laert. *l.* 8. in vit. *Archytæ.*

Gellius x. 12.

to be the ſcorn and entertainment of others henceforth. *Nor* will I engage *particularly* in the diſpute betwixt *him* and Mr. *Croſs*. I am informed, that the *Relation* is very *falſe*; and I profeſs I have no mind to believe this *Virtuoſo* in any thing he ſays. It is eaſie for him to miſreport a *private diſcourſe*; His great and admired friend Mr. *Sprat* relates general Encounters falſe; He tells us, "*Of a miſchance* "*that befel the* Chriſtian *Army in* Egypt *in the time of the* "Holy Warre. *Their ſtrength was great and irreſiſtible, if* "*they had only underſtood that which every* Egyptian *could* "*have taught them, the courſe and* the time of the overflow- "ing of the Nile. *For the want of that ſlender knowledge,* "*the braveſt men of all* Chriſtendome, *were led up to the Neck* "*in the* River, *and were forced to yield to the* Enemies *condi-* "*tions without ſtriking a ſtroke. This was occaſioned by the* "*ſtupidity of the* Cardinal *who commanded them. If he had* "*been leſs skilful in the* Schoolmen *and more in* Nature, *that* "*dreadful diſaſter had never happened.*— Such an untruth as the *Hiſtorian* tells here, ſuch perhaps is the *Narrative* of what paſſed betwixt him and Mr. *Croſs*. I cannot finde any ſuch Story in *Fullers Holy Warre*, but the contrary, *viz.* "E- "gypt *is a low level Countrey except ſome few advantages, which* "*the* Egyptians *had fortified for themſelves. Through the midſt* "*of the Land runs the River* Nilus, *whoſe ſtreams they had ſo* "*bridled with banks and ſluces, that they could keep it to be their* "*own ſervant, and make it their Enemies Maſter at pleaſure.* "*The* Chriſtians *confidently marched on, and the* Turks *per-* "*ceiving the Game was come within the wile, pierced their* "*banks, and unmuzling the River, let it run open mouth upon* "*them, yet ſo that at the firſt they drowned them but up to the* "middle *not to the neck.* There is no body charges the *Cardinal Pelagius*, who was *Legate*, and commanded the Army there, for invading *Egypt* in an unſeaſonable time, nor with being ignorant of the time when *Nile* did overflow. The *Chriſtians* were not ignorant of that, who had diſcovered and invaded *Egypt* before in 1218, and this was but two years after in 1220. The *Egyptians*, 'tis true, dammed up the River (which was now low) and upon the approach of the

Hiſt. of the R.S. Pag. 412.

Fullers Holy War, l. 3. c. 27.

the *Cardinal* cut their banks, and ſo gained the victory. That the *Cardinal* was no *Souldier*, and unacquainted with Stratagems of war, I grant; and for this Hiſtorians condemn him, but not for being ignorant of that part of *Natural Philoſophy*. A Member of the *Royal Society* publiſhed lately an account of the *Original of Nile*. The Deſcription had nothing of *News* in it to any *Scholar*, that was material. But they ſhould have procured an account of the manner of the inundation of *Nile*, for the *Hiſtorian* is more ignorant then the *Cardinal* of it. Had it been the time of the beginning of the overflowing of *Nile*, they might have retired eaſily to *Damiata* without damage; for it never exceeds in riſing above ten inches each day, ſometimes it ariſeth not *eight inches*. Juſt ſuch an Account, I fear, doth Mr. *Glanvill* give of Mr. *Croſs*'s diſcourſes, whom report ſpeaks ſo advantagiouſly of, that we muſt give the Lie to *general fame*, or believe him a *very learned Perſon*, as well as *pious*. Perhaps he, as well as my Lord *Bacon* might ſuſpect the truth of thoſe *Teleſcopes*. And perhaps alſo he might be miſtaken in ſaying that *Ariſtotle* did *travel all over Aſia*: yet, however that, that *Jonſſius* (*de Script. Philoſ. l.*1 *c.*18.) diſproves *that opinion*, yet no leſs man then *Joſephus l.* 1. *adv. Apionem*, was deceived as well as Mr. *Croſs*. *Solinus* alſo *c.* 14 and *Ammonius* in the life of *Ariſtotle* ſay, that *Ariſtotle* did accompany *Alexander* in his *Aſiatick* Expedition. And I profeſs my ſelf in an errour as well as Mr. *Croſs*, if it be not true, that *Ariſtotle* had ſundry advantages to pen his *Hiſtory of Animals* which our *Virtuoſi* want. *Pliny* Nat. Hiſt. l. 8. c. 16. ſaith, *Alexandro Magno rege inflammato cupidine animalium naturas noſcendi, delegataque hac commentatione* Ariſtoteli, *ſummo in omni doctrina viro, aliquot millia hominum in totius* Aſiæ, Greciæque *tractu parere juſſa, omnium quos venatus, aucupia, piſcatuſque alebant: quibuſque vivaria, armenta,*

Proſper. Alpin. de Medic. Ægypt. l 1, *c*, 8.

I know not what *Logick* Mr *Glanvill* read at *Oxford*, but 'tis *Ignoratio Elenchi* in him, to oppoſe what Mr. *Croſs* might ſay about *Aſia* as twas of old named, and bounded, and travelled over, with the *new* diſcoveries of *China*, *Japan*, *&c* which rather conſtitute a fifth part of the world, then are included in *Aſia*. That is *Aſia*, which they imported that gave it the *name*, not what others affix to it. By the ſame Sophiſtry it may be ſaid that the *former Kings* were not *Kings of France*, becauſe *late Conqueſts* have enlarged the *borders*.

Nor was *Ariſtotle* implicitly guided by the *relations* of thoſe *Hunters*, *&c.* he diligently inquired into their reports, and oftentimes refutes the *vulgar ſtories*. See this particularly aſſerted by *Federicus Bonaventura* de partu Octomeſtri l. 5. c. 62.

menta, alvearia, piſcinæ, aviaria in cura erant: nequid uſquam gentium ignoraretur ab eo: quos percontando, quinquaginta fermè volumina illa præclara de animalibus condidit.

Let a man now conſider the greatneſs of *Alexander*, the impatience he had to effect his purpoſes, how *generous* he was in acknowledging Services, and how *vindicative* when neglected, and how underſtanding to know what was done and omitted: Let any man conſider this, and he will think that *the Society* have not a Patron that intereſſeth himſelf ſo much as *Alexander* did for *Ariſtotle*. He had ſeveral thouſands commanded to give him intelligence: their number tranſcends any that ours can pretend to: their *quality* is ſuch as the *R. Society* wiſheth for, *viz. Intelligence from the conſtant and unerring uſe of Experienced men, of the moſt unaffected and moſt unartificial kinds of life.* And if notwithſtanding all theſe circumſtances *Ariſtotle* were abuſed or miſtaken, or defective in his *Narrations*, I am confident there is leſs credit to be placed in the *Narrations* of ſome of our *Virtuoſi*, who have been ſo miſtaken in their Accounts of *Cider* and *Salt-Peter*, domeſtick Enquiries; what man will give himſelf the trouble to inform *them*, either at home, or abroad? with what *negligence* and *imperfectneſs* will they regiſter things? how *un-philoſophical* will their *memoires* be? How will they be able by intreaty to procure a *ſecond information*? That there are more parts of the *world* diſcovered and ſailed unto then in *Ariſtotles* time, I grant. But what certainty ſhall we have of *Narratives* picked up from *negligent*, or *un-accurate Merchants* and *Seamen*? What judgement have theſe *men of no reading*, whereby to *rectify* or *enlarge* their *Enquiries*? Mr. *Glanvill* doth not ſo much as know who writ well upon the ſeveral *ſubjects*, in which he pretends that the *Moderns* have out-done the *Ancients*. As Improvers of the *Hiſtory* of *Bathes* (by the way we are far inferiour to them in the practice of *Bathing*) he reckons *Savanarola* for one: he might as well have recounted *Bayrus*, *Gordonius* and *Gatinaria*: or any of the *barbarous Phyſicians*, for advancers of the *practick*: He might have told us of a Volume of Writers *de balneis*: But why did he omit *Soli-*

Mr. *Sprat*. p. 257.

nander

nander de thermis, *Libavius*, and our Dr. *Jordan* (who lived at our *Bathe*) and *Bauhinus de fonte Bollenſi*, and the other Writers about particular *Bathes*? Alas! *He* knew them not: nor did I ever hear any man commend *Blanchellus* upon that ſubject. About Minerals, could he not have named *Encelius*, *Cæſalpinus*, *Fallopius*, and *Lazarus Erkerus*, whom I find by ſome to be preferred before *Agricola*? In his Account of remote *Hiſtories of Nature*, could he remember the Author of the *Caribby-Hiſtory*, and paſs by *Carolus Piſo*, *Burggravius*, and *Bontius* about *Braſile* and the *Eaſt Indies*. So where he ſpeaks of diſcoveries made by *Microſcopes* (pag. 57.) by naming *only* Dr. *Power* and Mr. *Hooke*, ingenious *Mechanicks*, Members of the *Royal Society*; he ſeems to intimate, as if none but the *Virtuoſi* had proceeded in that *adventure*, whereas *Petrus Borellus*, Phyſician in ordinary to the King of *Erance*, publiſhed a Century of *Microſcopical* obſervations *An. Dom.* 1656. ſuch as have (if true) more of *utility* then thoſe of Mr. *Hooke*, though leſs of *curioſity*, and deſtitute of *Cuts*; and *Kircher* after many years employed in thoſe contemplations, *per exquiſitiſſima Microſcopia*, did publiſh ſeveral Experiments of *that kinde*, in his book *de Peſte*; and *Nicolaus Zucchius* about the ſame time (1656.) publiſhed a ſhort account of *Microſcopical* obſervations, about a *Lowſe*, *a Flea*, the feathers of a *Peacocks tail*, &c. encouraging others to proſecute the *work*. He tells us, (*pag.* 56.) "*that the diſcoveries by* Teleſcopes *may inform us* "*of the* Longitudes: *upon which* muſt needs *enſue yet greater* "*improvements of* Navigation, *and perhaps the diſcovery of the* "North-weſt *paſſage*, *and yet* unknown South. I grant that the *invention of Longitudes* will be extreamly beneficial to man-kinde in point of *ſailing*: and the *R.S.* have made great boaſts how that it ſhall be atchieved by their *Members*; and thereupon cauſed ſome projects to be rejected, which yet perhaps would have proved as *unfeaſible* as the attempt of *Galileo*'s, to calculate it by the *Medicean Starrs*. I deſire much to ſee the happy reſult of our *Virtuoſi*, though the conſequences here affixed to *it*, as *Improvements* was very *defective*. I ſhall propoſe ſome Scruples about the *North-weſt* paſſage, and

Kerch. de Peſte ſect. 1. c. 7.

Nic. Zucchius Philoſ. optic. part. 2. tr. 3. c. 7. ſect. 4. p. 348.

and the *utility* of its discovery, as also of the hopes of finding out the *Southern Tracts*.

First, I say that the story about the streights of *Aman* is very *improbable*, if not certainly a *Fiction*. It hath been so thorowly search'd into by our *Nation*, that there is no encouragement to a further trial: and this Streight of the *North-west* passage, is indeed nothing but a narrow difficult passage to *Button's* Bay, the entrance being properly called *Hudson's* Streight, in regard of his first finding it; the mouth whereof lies in 62 degrees. But were there such a *passage*, it would much more concern the *Portugals*, and the *Spaniards*, and *Dutch*, then it doth the *English*; for their trade is to the *North-part* of the *East-Indies*, and ours to the *South*: theirs to the *Moluccoes*, *Philippinas*, *Japan*, and *China*; whereas we seldom pass beyond *Bantam* in *Java*.

See Mr. *Gardiner* in his description of *America* c. 25. where he professeth to write nothing but what his *own knowledge*, or *good intelligence* perswaded him unto, he having lived long in the remote parts of *America*: the fols of whose *large Account* thereof we may deplore.

Secondly, were there a *passage* that way, yet it were not to be chosen before the other: for, could a man sail in a *strait line*, first from *England* to the *Streight*, and thence from the *Streight* to the *East-Indies*, it would prove a *further* way then the other by the *Cape of good Hope*. But those that know any thing of those Seas, know that the Sea-Course to any part of *North-America*, is as low as 23, 24, 25, or 30 the highest by reason of the *winde* which bloweth in the *South-sea* East and West, as well as in the North, that is to say, for the most part *West* without the *Tropicks*, and almost constantly *East* within *them*. Wherefore you must go out of your way as well from the North-part of *America* to the *East-Indies*, as from *England* to this supposed *Streight*: and there is as much difference in relation to pleasantness in the Voyages, as between *Summer* and *Winter*. For when one is clear of the Bay of *Biscay*, in all the Voyage by the *Cape* you find no *cold* weather till you return to the same place again: but on the contrary, it is so cold and Icy about the *Streight* in the middle of *Summer*, that there is no making way without much difficulty and trouble. And in the *South-Sea*, where the *Sunne* keeps the same course as in the *North* in *June*; Sir *Francis Drake* in compassing the world, found so much cold in thirty eight degrees of North-lati-

Judge hence what hopes there is of making discoveries in the *Southerne Tracts*.

tude,

tude, that he was forced into a *Southerly* courſe. Beſides, if we may take a conjecture from the *windes*, which have blown when the Undertakers for that diſcovery paſſed into thoſe *Streights*, one would gueſs by their *great coldneſs*, that they did *blow from the Land*, and conſequently that there is no Sea to the *North* of *America*, but that the Land of this *New World* reacheth by the *North* parts, even to the *North*-wardly Provinces of *Tartary*, &c.

I am ſurprized to finde, that Mr. *Glanvill* doth not make the *Moderns* to ſurpaſs the *Ancients*, in *Architecture*, *Sculpture*, *Picture*, and ſeveral other Arts of *ingenious Luxury*. That he doth not advance the glory of our *Mathematical* burning-*Glaſſes*, above the *Specula Uſtoria* of *Proclus*; and the Artificial Fires of our *Virtuoſi* above thoſe invented by *Callinicus*, when he burned the *Saracens* Fleet.

But not to upbraid *him* with what he hath omitted: I ſhall reſume the diſcourſe about *Teleſcopes*, and their *fallaciouſneſs*, wherein if Mr. *Croſs* was a little *doubtful*, yet Mr. *Glanvill* is ſo *aſſured*, that *he* makes an *ample recital* of the *conteſt*, and the advantages he gained in it. I ſhall ſet down his words, the better to divert my *Reader*, and to ſhew how inſupportable ſuch kind of *men* are in all *judicious* and *intelligent* company.

Mr. *Glanvills* Plus Ultra c. 9 p. 65.

"To my Diſcourſe about the *Dioptrick Tubes*, the *Teleſcope* and *Microſcope*, the **Reverend Diſputer** replied, [*That "our Glaſſes were all deceitful and fallacious*] Which Anſwer "minds me of the *good Woman*, who when her Husband "urged in an occaſion of difference, [*I ſaw it, and ſhall I not "believe my own Eyes?*] Replied briskly, **will you believe "your own Eyes before your own Dear wife?** And it ſeems "*this Gentleman* thinks it unreaſonable we ſhould *believe ours*, "before his *own dear Ariſtotle*.

"For an aſſurance of the *credit* of thoſe *Glaſſes*, I told him "he might *try* them upon *objects near*, and *eaſily viſible* by the "*unaſſiſted ſight*; and if he made the *trial*, he would finde "they *altered* the *objects* in nothing but their *proportions*, "which are repreſented *larger* for the advantage of *viſion* in "things *ſmall* and *remote*; and we have all the like reaſons to

diſtruſt

" *diſtruſt our Eyes*, as theſe *Glaſſes* (for their *informations*
" are the *ſame* in all things, but the *mentioned difference*) and
" there is no man ſo much a fool as not to make allowances
" for *that*. Never was any yet ſo groſly deceived by the *Micro-*
" *ſcope*, as to be perſwaded that a *Flea* is as *big* as a *Lobſter*;
" nor did the *Teleſcope* ever make any one believe that the
" *Moon* was at the *end* of his *Tube*: But if the *former* repre-
" ſents that *little Creature* as *briſtled* and *jamar'd*, and the *o-*
" *ther* makes the *Planet mountanous* and *uneven*, we have no
" reaſon to believe but that their *reports* are *ſincere*, though
" our *unaided* Senſes are too *groſs* to perceive either the one
" or other; ſince, if the mentioned *briſtles* and *jamars* are
" in the *Glaſs*, and not in the *Animal*, they would appear in
" like manner in all the ſmall Creatures which in the ſame
" light and poſition are look't on through the *Microſcope*:
" And if the *ruggedneſs* of *ſurface* were in *it*, and not in the
" *Moon*, the *ſame* would be ſeen upon all other *diſtant Ob-*
" *jects*, that are view'd through the other *Optick Inſtrument*.
" And if there be *deceit* in thoſe *Glaſſes*, Seamen had need
" beware how they truſt them, ſince the *Flags* which appear
" to be *thoſe* of their *Friends* in the *Perſpective*, may be re-
" ally the *Colours* of their *Enemies*.

" Upon theſe Accounts, Sir, which afford *plain* and *ſen-*
" *ſible* evidence, I wondred much at the Diſputers *ſtrange*
" *ſuſpicion*, which had been ſcarce *pardonable* in a *vulgar* head;
" and I know not what to call it in *one*, that would be
" thought a *Philoſopher*: But the *wary* man gave a *reaſon*,
" which made me as much *wonder* at his *Argument*, as
" his *Doubt*. And to *this* attend Ye *Philoſophers* of the *ROY-*
" *AL COLLEDGE*, and prepare your ſelves to anſwer a
" *Demonſtration* from *Experience* againſt your *Glaſſes*; Raiſe
" your *Expectations* for a *wonderful*, *convictive Experiment*;
" Let the *Mountains travel*, and the *Birth* will follow. [*Take*
" *two Spectacles* (ſaith the Experimental Sage) *uſe them*
" *at the ſame time, and you will not ſee ſo well as with one ſingly.*]
" therefore your *Microſcopes* and *Teleſcopes* are *Impoſtors*.
" This man, Sir, is a *Logician*, and no doubt you *perceive ſo*.
" O how I admire this *rare faculty* of *arguing*! How *dull* are

" our *Wits*, to thoſe *ſubtile, Eagle-ey'd Schoolmen*, who ſee
" *Concluſions ſo far* off, through the more *unerring Teleſcopes*
" of their own piercing Underſtandings? Did ever *old man*
" before make *this* uſe of his *Spectacles*: But to leave won-
" dring, let's endeavour to underſtand this *Philoſophy* of
" Chue. How a man may *ſee* by *Spectacles*, that *Perſpectives*
" are *deceitful*. [*We can ſee better through one pair, than two*]
" ſaith the deep Philoſopher. Moſt *ſagely* obſerv'd! The
" Argument *begins ſtrongly*: But in the name of *Ariſtotle*,
" whence comes the *Conſequence*? *Therefore* Perſpectives *are*
" *fallacious*.

" *One* Propoſition *for* Sence,
" *And* th' other *for* Convenience.

" This fits his purpoſe to diſcredit *new Diſcoveries*, 'tis no
" matter how it follows. This Gentleman, you muſt know,
" Sir, uſeth to have his *word* taken among his *admiring Neigh-*
" *bours*, and ſo is not wont to be put to the *trouble* of *pro-*
" *ving*: but I was ſo *unmannerly* as to expect *it*, chuſing ra-
" ther to *ſee* with mine own *Eyes*, than his *infallible Spe-*
" *ctacles*. *We can ſee better* —— ſaith the Diſputer. How
" doth *he* know *that*? If *Perſpectives deceive* us, though
" *naked ſenſe* witneſs for them, Why may not his *ſingle Spe-*
" *ctacles* be as *deceitful* as *they*? *Theſe* repreſent things *big-*
" *ger* than they *are* to the *unaided ſight*; and the *Philoſophi-*
" *cal Glaſſes* do but the *ſame thing*, in a *higher degree* of
" *magnifying* the *Object*. But we allow him the benefit of
" his *ſingle Spectacles*, though he will not be ſo courteous to
" our *Glaſſes*, and confeſs his Reverend Experiment of the
" *uſe* of *two*, but are *inquiſitive* about the *Conſequence*. The
" *Reaſon* of which certainly *muſt be*, (if any be intended in
" it) that our *Teleſcopes* and *Microſcopes* have a *Glaſs* at each
" end, which the Man of Sapience thinks anſwers the two
" pair of *Spectacles*, and therefore muſt render the *Repre-*
" *ſentation deceitful*. If this *Philoſopher* had ſpared ſome of
" thoſe thoughts to the *profitable* doctrine of *Opticks*, which
" he hath ſpent upon *Genus* and *Species*, we had never heard

" of

" of this *Objection*, which is as much a reaſon againſt the *credit*
" of all *Perſpective Glaſſes* whatſoever, as the *Philoſophical*
" ones he would diſcredit. And without more *Opticks* than
" thoſe of *natural Underſtanding*, he might, if it had pleaſed
" him, have known, that we *ſee better* through the *two Glaſ-*
" *ſes* in *Perſpectives*, then any *ſingle* one; becauſe they are
" ſo faſhioned and ordered, that the *viſive rays* are better ga-
" thered and united by them for the advantage of ſight: But
" in the *two Spectacles*, the caſe is contrary. Theſe things
" I ſuggeſted, and ſome others from the *Dioptricks*, in which
" this Sage Perſon was pleaſed then to conceal his Know-
" ledge; and how great *that* was in theſe matters, will ap-
" pear by the *Learned Problem* he propoſed at this period of
our Diſcourſe, [Why we cannot ſee with two pair of Spectacles better than with one ſingly? For, ſaith the Man of Axioms, *Vis unita fortior?*] A *pleaſant* piece of *Philoſo-*
" *phy* this; And I'le ſhew the Diſputer how ſtrongly he in-
" fers from his *Maxim*, by another Queſtion like it. Why
" cannot he write *better* with *two Pens* then with a *ſingle one*,
" ſince *Vis unita fortior*? When he hath anſwered *this Quære*,
" he hath reſolved his own. I ſaid in the Diſcourſe, That
" the reaſon he gave why one would expect it ſhould be *ſo*,
" is the reaſon why 'tis not; and this is plain enough to
" *ſenſe*, from the *confuſion* of *Viſion*, which ſhews, that the *rays*
" are *not united* after the way requiſite for the aiding the
" ſight (as I juſt now intimated) and how that ſhould *be*, I
" had here ſhewn, but that I am aſhamed to adde more in
" *earneſt* about a grave *foolery*.——

Upon this Diſcourſe, the firſt *Remark* I ſhall make is, That Mr. *Glanvill* hath *little* or *no* inſight into *Opticks*, and is in a manner as ignorant in that *profitable Science*, as he repreſents his *Adverſary* to be. It is *ſomething* for a Man to be able to give an account how he ſpent his time, though about *Genus* and *Species*; rather then to appear to have *idly* paſs'd it away, without acquiring *any knowledge at all*. The Solution of Mr. *Croſs*'s fallacy, (if it were *his*) by that Intergatory, *Why cannot he write better with two Pens, then with a ſingle one?* is ridiculous, ſince there is no *vis unita* there:

and

and in one ſort of *Tubes*, though the *rays* be *united* in the firſt *convex-Glaſs*, and brought to a *Convergency*, yet muſt the *Spherical Cavity* of the next *Glaſs* dilate again, and diſpoſe them *fittingly* to effect the expected *viſion* in the *Retina*: and beſides this, it is requiſite that the Tube be ſo *fitted* unto the *eye* (not to ſpeak of the *fitting it differently* according as the *Medium* is) as to exclude all other *impreſſions* and *radiations*, that may *divert* and *impede* the *ſight*, viz. *Ad conſulendum ſufficienti determinationi potentiæ per languidiorem & anguſtiorem impreſſionem à remotioribus, multum prodeſt, ſi ex forma inſtrumenti & ejus applicatione ad Oculum vel ex conditione loci è quo per inſtrumentum remotiora, & in minori amplitudine apparentia proſpectamus, impediuntur radiationes aliunde intra oculum ſimul & ſemel diffuſæ; præſertim validæ.*

Vitrum Sphæricè earum, dilatando radios per ipſum tranſmiſſos amplificat notabiliter imaginem, ſi in debitâ diſtantiâ conſtituatur poſt Sphæricè convexum. *Zucchius phil. opt part.2.tr.1.c.7 ſect 5. pag.* 360,361,362. How it is in *Teleſcopes* made up of all *convex-Glaſſes*, the ſame Author ſhews there: and ſo doth *Kepler* in his *Dioptricks*.

Zucchius philoſ.opt. part.2. tr.3.c.7.ſect.5. p.358.

As to what Mr. *Croſs* is ſaid to have argued againſt *Teleſcopes*, that the addition of *one Glaſs* to *another* muſt *hinder* rather then improve *viſion*, becauſe that the ſuperadding of *one* pair of *Spectacles* to *another*, rather *weakens* then *amends* the *ſight*. I *muſt* ſay, that whoſoever underſtands the *forming of an Argument* cannot except againſt the *form* of that, nor do the *Propoſitions* cohere ſo ill together, as that one ſhould be as it were *for ſence*, and other, *for convenience*. All that excurſion of our *Virtuoſo* ſhews *his Ignorance*, not Mr. *Croſs*'s. 'Tis one thing to except againſt the *form*, another thing to except againſt the *matter* of a *Syllogiſm*. I confeſs there is *reaſon* enough for to do the *latter*; but now for the *other* procedure. *I* believe ſuch a *diſpute* was never heard of ſince the declining of *Arcadia*, as this was: If Mr. *Croſs* did urge this otherwiſe then to try the *Intellectuals* of Mr. *Glanvill*, (concerning whoſe *inhability* he might be *well ſatisfied*) there is no defence to be made for *him*, otherwiſe then that he was unacquainted with a *ſort of knowledge* which is *unneceſſary* in a *Divine*, and not expected from *him*; whoſe *credit* is better ſupported by thoſe *Qualifications* which repreſent *him* as a man of *godly Converſation*, *faithful* and *able*

in

in the discharge of his *Gospel-Ministry*. But that Mr. *Glanvill* as little understood the *subject* of a *knowledge he pretends unto*, it is manifest from hence; that he might easily have denied the Assertion of the *Spectacles*, that *two pair* did not *impede*, but *amend* the *sight* in *some eyes* that are *very weak*. I know a young Gentlewoman that hath two *Cataracts* breeding in her eyes, which *reads* and works with *two pair of Spectacles*, whereas she cannot with *one pair*. There is also an old Gentlewoman of my acquaintance who useth the *same helps*. I am ashamed to debate *these fooleries* (as our *Virtuoso* calls *them*,) but if Mr. *Cross* did call in question the *integrity* of the *Telescopes*, I shall assume the liberty of a digression about *that Point*, which perhaps may not seem *unseasonable* in *this Age*, and which will abate the *pride*, and evince the great *ignorance* of Mr. *Glanvill*.

Either my Memory doth very much deceive *me*, or else the Lord *Bacon* did suspect these *Telescopes*, that they might *impose upon our Senses*: and I am sure Mr *Boyle* is in the same Errour with Mr. *Cross*, for *he* complains that when *He* went about to examine those appearances in the *Sunne* called *Maculæ*, and *Faculæ solares*, he could not make the least discovery of them *in many months*, which yet other *Observators* pretend to see *every day*: yet doth Mr. *Boyle* profess, that *He* neither wanted the conveniency of excellent *Telescopes*, nor omitted any *circumstance* requisite to the *Enquiry*. Besides these, *Scipio Claramontius*, he that baffled *Tycho* about the *Comets* in the judgement of most men, and gained advantages enough against *Kepler* and *Galilæo* to make himself *glorious*, and to shew that instead of *Mathematical demonstrations* they proceeded upon *uncertain Topicks* and *Probabilities*: this learned and *inquisitive* person doth avowedly suspect the *Telescopes* as *fallacious* more then once, and that there are more then *He* of *that judgement*, is a thing unquestionable by any but *Superficial Scholars*: nor do I apprehend any *other reason* then *this* to be in their

Tentam. Physiolog. pag. 144. 145, 146.

Vide *Ricciol. Almagest.* nov. l. 8. sect. 1. c. 16.

Scipio Claramontius in defensione *Anti-Tychonis*, & libri de novis stellis à se conscripti Italico idiomate editâ, multis contendit Telescopium in repræsentatione objectorum fallax esse, *Part.* 2. *c.* 15. ex quibus infert c. 16. ei qui velit apparentias cœlestium per illud exceptas ratas haberi, necessariò ostendendum esse à nullâ aberrationum, quibus illud obnoxium est, hujusmodi nitidas esse. Quare cum ex una parte assumi nequeat, quasi universaliter verum quicquid per Telescopium repræsentatur; ex alia

heads

parte non possit talis propositio universalis restringi ad apparentias cœlestium, sine manifestâ *petitione principii*, cum hoc ipsum sit quod controvertitur; *an fallaci de se instrumento observata in cœlestibus pro certis habenda sint?* manifeste sequitur nihil ex usu *Telescopii* constitui posse de dispositione cœlestium. *Zucchius Philos. opt. part.1. c.17. sect.2. p.175.*

heads, who have till this day employed their thoughts here to contrive new *Glasses*, and *amend* defects in the former. Our *Virtuosi* have complained of an *Iris* in their *Glasses*, and gone about to correct that by *Turning of them*; but a *friend* of mine writes, that *he* imagines it was after that *Eustachio Divini* at *Rome* had given them an *hint of it*: and then they *found it out*. A little more modesty in *Assertions of this kinde* would become our *Wits*, considering that affairs of this nature (it is the opinion of *Archimedes*, and refers to all *Mechanismes*) admit not demonstration. *Cum neque visus, neque manus, neque instrumenta per quæ experiri oportet, satis habeant fidei ad exquisitam demonstrationem.*—— Archimed. in libro *de Arena*.

I shall not so far engage in the controversie, as to repeat the *Arguments* and *Replies* on both sides. It seems *strange*, that the Telescopes should so *magnifie* thirty, fourty, or one hundred times *objects on earth*, and yet lessen those of the *fixed Stars in Heaven*, viz. *Stellas primæ magnitudinis*, Caniculam, &c. Jovem, Saturnum *minores repræsentat multo, quam oculo libero appareant: & idem instrumentum* stellas nusquam apparentes, *ut* Jovis Satellites *justæ magnitudinis repræsentat, & paulo minores repræsentato* Jove, *imò tantas facit, ut possint pius apparere, quam queant apparere stellæ primæ magnitudinis,—— at quid? in Octava Sphæra stellas nihil apparentes magnas facit, Nebulosas scilicet & Galaxiæ formatrices.*— This is granted all by *Galileo* to be *true*, but he solves by an imaginary *irradiation*, the fancie whereof he advanced upon some weak *Experiments*, most whereof he deserted himself, and the rest are excellently refuted by *Zucchius*, who introduceth another *Salvo* from the *configuration* of the *Eye*, and that part of it called *Uvea*: which perhaps may be discovered to be as *false* as any of the other hereafter: but he adds, *Ex quo est, ut in facilitate detrahendæ circumfusæ sideribus radiationis sit notabile discrimen inter Planetas collatos inter se, & inter stellas fixas invicem, & aliquas earum cum aliquibus eorum comparatas.*

Scipio Claramont. de universo l.9.c. xxi.

Vide *Scip. Claram.* de universo l.9 c. 17.18.19, 20 *Zucchius* phil. opt. par.1.c.1 sect.6.p.111. Id.ib p.216.

ratas. Thus the Objection in its full force is granted by all (except *Sorsius* deny it) only the cause of the *Phænomenon* was not till *Zucchius* (if then) sufficiently explicated; Sure I am that *he* in another place avows, that long *Telescopes* rightly made do not lessen *Jupiter*, but represent him *greater* then He appears to the *naked Eye*: insomuch that his *Tube* of 23 feet-long did represent *Jupiter* as big as the *Moon* is when at *full*, and looked upon without any *Telescope*: so that He says the *Objection* holds only in *Telescopiis brevioribus, in quibus pariter evenit inspiciendo lucida inferiora.*

Zucchius phil.opr. part. 1.c.12. sect.5. p 199,200.

Besides, were there such certainty in the *Telescopes*, how comes it to pass that there is such a *variety of opinions* amongst those *Observators*, whose *diligence* can be as little suspected as their *learning*? *Claramontius* did set two persons to observe the *Spots of the Sunne*, (both were inclined to *Novelties*) they were not 40 miles distant, yet did not their *Schemes* agree as to *number*, or *situation.* Nor is this a *figment* of that partial *Peripatetick*: any man that reads *Ricciolus*, and *Zucchius*, will see that they cannot agree about the *number*, the *motion*, the *situation*, or so much as colour of *them.* The words of this last *Writer* are very remarkable in reference to Mr. *Glanvill*, and that certainty which *he* asserts unto the *Telescopes*, viz. *Neque obstat discrepantia numeri, vel figuræ macularum in observationibus plurium, circa idem tempus captatis: tum quia longiores Telescopii in ampliori disco plures exhibent, quæ spectantem breviore Telescopio, angustiori disco latent: immo eodem Telescopio, ad exactam mensuram suæ extensionis redacto, notabiles fiunt aliquæ, ante inobservatæ: & facillimum est in tali mensura minus exercitatos decipi; cum tam pauci ex observatoribus, nec nisi monente* Scheinero, *didicerint ad exacte consignandam Solis imaginem, & in ea maculas, per trajectionem radiorum Telescopio in planum directe oppositum, necessariam esse mutationem extensionis Tubi, eo notabiliter magis producto in hyeme, correpto in æstate: Tum quia sicut facilis est, ex allatis, varietas in numero macularum, ita in terminatione, quæ facilius mutari potest ex iisdem capitibus in illis, quæ in pluribus observationibus consignantur, & ex modo consignandi.* Less do they agree about

Ricciol Almag. nov. l.3. c 3

Zucchius phil.opr. par 1.c 7. sect 8.p.233.

See this point of the *variety* about the *spots in the Sun*, particularly handled by *Schottus* in his Notes upon *Kircherus's Iter exstaticum cœleste. Itiner.* 1. *dialog.* p 183. And how different the observations of *Galileo* and *Schriner* were you may see in a *Synopsis* in the *Rosa Ursina* l. 3. c. 4. & ibi c 10.

about the *nature of them*: one *Joannes Farde* named them *Aſtra Borbonia*: and *Malapertius*, *Maſtrius*, *Rheita*, do hold them to be *Starrs*: of this opinion was *Scheinerus* once, but he afterwards aſſented to that of *Galilæo*, *Kepler*, *Bullialdus* and *Blancanus*, that *they were not Starrs*, but *fuliginous exhalations* ariſing out of the *furnace* of the *Solar Globe*, which he conceives to be a *fire*. *Kircher* and others are of the ſame judgement; but *Ricciolus* diſtruſts it, being not able to comprehend how *fuliginous vapours* ſhould ariſe in *ſuch a number*, ſo *conſtantly*, ſo *permanently* as to keep a *motion* about, or with the *Sunne*, of about 27 days.

Vide *Schottum* ubi ſupra, p. 184. *Ricciol.* Almag. nov. l. 3. c. 3 p. 57.

The like *uncertainty* there is in the *Obſervations* about *Saturn*, *Jupiter*, *Mars*, *&c.* what controverſies do they raiſe and how contradictious are their *Relations*? *Galilæo* doth repreſent *Saturn* in one figure, *Scheiner* in another: the former ſaith, that the *oblong* ſhape in *Saturn* ariſeth from a defect in the *Teleſcope*, or *Eye*, that could not diſtinguiſh the *Comites Saturni* from the *Planet* it ſelf. But *Ricciolus* and others diſſent from *him* in *that point*: and *Chriſtianus Hugenius* made obſervations about *Saturn*, ſuch as neither *Antonius de Rheita*, nor *Hevelius* did ever ſee; and repreſents the *anſulæ* of *Saturn*, differently from what *Fontana* and the *Dantiſcan Selenographer* do write. The words of *Hugenius* I ſhall propoſe to Mr. *Glanvill's* conſideration, *Expectamus ut ſub finem* Aprilis, *ſi non antea, brachia Saturno renaſcantur*, non curva illa, *cujuſmodi a* Franciſco Fontana, & Hevelio *depicta cernuntur, ſed* ſecundùm lineam rectam *utrinque prominentia*, ſiquis melioris notæ perſpicillo intueatur. *Nam* vulgaria ſi adhibeat *binos orbiculos referent, ſicuti* Galilæo *primum ſe obtulere. Noſtram quo* Saturni *aſſeclam reperimus, quinquagies diametrum rei viſæ multiplicat, duodenos pedes æquans; cui poſtea duplum longitudine conſtriximus, multiplicatione centupla. Cum autem* longiora etiam hiſce Teleſcopia, *utpote triginta & quadraginta pedum ab aliis fabricari dicantur, aliquid aut vitrii vitii ineſſe, aut hæc eadem non debita proportione mutuo reſpondere credibile eſt. Neque enim alius hucuſque aciem eorum effugiſſet novus* Saturni Satelles.

Galilæo in ep. ad Velſerum, citante *Campanella* de univerſ. l. 9. c. 5. *Ricciolus* Almag. nov. l. 7. ſect. 1. c. 2. p. 487, 488. *Schottus* in *Kircher.* iter exſtat. cœleſte p. 301, 302. *Chriſt. Hugenius* apud *Bartellum* de coruſcationibus, p. 63.

Being to ſpeak of *Saturn*, I muſt not forget *Zucchius*, who

after

after *thirty five years* diligent obſervation with variety of the beſt *Teleſcopes*, repreſents this Planet *differently* from what any others write, viz. *Aſſero Saturnum multorum annorum ſpatio figura paſſim oblonga, & in oppoſitione ad Solem, notabiliter majorem apparuiſſe, in apparentiæ medio viſum eſſe album illuſtre tumidum, aliquo modo ad rotunditatem vergens, accedentibus hinc inde ad illud duabus velut nigris notis, quas altum illuſtre, totam apparentiam ad apices terminans ita includit, ut ad apices illius multo ſit craſſius, ubi vero eas notas complectendo ad medium extenditur, gracileſcat.* Zucchius philoſ. opt. parr. 1. c. 17. ſect 5, p. 00,201.

Aſſertio eſt facti, in quo a multis jam, annis conveniunt accuratiores, ex variis Provinciis obſervatores longioribus Teleſcopiis inſtructi.

Scio *a prioribus vulgatum, tres a ſe ſtellas in loco* Saturni *ſpectatas, media multo majori, quæ ſimul mutantes in cœlo ſitum, a fixis aperte diſtinguerentur, &* Saturni *duobus Planetis minoribus ſtipati apparentium exhiberent, qui poſtea, illis a tali ſitu motis ſpectatus ſit figura rotunda. Verum triginta quinque ut minimum, anni ſunt, quibus figura ſemper oblonga, cum diſpoſitione in aſſertione aſſignata, a me ſpectatus eſt pluries quotannis, pro vario ad* Solem *ſitu,* acutioribus, minus acutis, cavis, convexiſque *lentibus ad oculum proxime in Teleſcopio adhibitis apparentia eadem, ſemper magis diſtincta, & majori, in oppoſitione ad Solem, etiamſi meliorem vitiorum elaborationem in multo longioribus Teleſcopiis poſtremo* D. D. Evangeliſtæ Torricellii, & Euſtachii Divini *artificio, & beneficio ſingulari conſecutus ſim.—Quare in hoc* priorum obſervationes, *qui* brevioribus, *minuſque perfectis Teleſcopiis, ut omnino ratas admittere non audeo.*

Concerning *Jupiter*, and his *Satellites*, and their *number*, taking in the *Urban Octavian* Starrs, I finde a great variety, even when two men obſerved at the ſame time, as *de Rheita* and *Gaſſendus*: that both of them *were in the right*, cannot be ſaid: which of them were in the wrong, I know not. In ſumme, the obſervations about *Jupiter* and his *Attendants* are ſo various, *Aliter enim apparuerunt* Simoni Mario, *aliter* Apelli, *aliter* Galilæo, that *Claramontius* takes *this advantage* of it. *Ego igitur argumentum ex ejuſmodi diverſitate alicio* Vide *Schottum* in *Kirch.* iter exſtaticum cœleſte p 268, 269 &c. *Riciol.* in Almag. nov. l. 7. ſect. 17. p. 486.

Scipio Claramonti s de universo l. 5. c. 8.

contra veritatem objecti, non contra observationum diligentiam, cum observatio ejusmodi non sit nisi pura per tubum transpectio, eaque defixa: ii etiam viri perfectum instrumentum habebant, estque id verisimile, cum in eam rem toti incumberent, instrumentum etiam exactum paravisse: oculorum etiam & visus acumen, cur demam Apelli & ejus in observando sociis, potius Galilæo demerem, qui se fatetur oculum minus perfectum habere

Neither are they better agreed about *Mars* and his *Figure*, the *umbo* or *spot* in him. *Gassendus* denies that ever he saw it, though he used the *Tube* of *Galilæo*; others avow it: as you may see in *Schottus* and *Ricciolus*. In fine, as to the new *Phænomena* about *Mars*, *Venus*, and *Mercury*, to defend them *Zucchius* is forced to complain of the *Telescopes*, and protests thus. *Interim te, amice Lector, provoco Spectatorem, bono & longiore Telescopio instructum, cujus Lens superior ad obtinendam figuram apparentiarum bene præcisam, juxta dicta, maxima ex parte contecta sit, modico ad medium aperto foramine.*

Scottus in Kircher. iter extat. Cœlest. p. 242, &c. Ricciolus Almag nov. l. 7. sect. 1. p 486. Zucchius phil opt. part 1. c. 17. sect. 4 p. 193.

I am tired with the further prosecution of this subject; and therefore shall confine the rest of my discourse to the *Observations* about the *Moon*: the contemplation whereof, as it is more *facile*, so it hath been more pursued then any other of that kinde. There is none of our *Comicall Wits* doubt that it is a *World*, divided into *Hills*, *Valleys*, *Seas*, *Lakes*, *Rivers*, and even *peopled* as this *Terraqueous Globe* of ours But it is remarkable, that the use of the *Telescope* hath not convinced *some*, that the *Moon* hath an *unequal surface*, but that the *Phænomena* of the *spots* may be solved by the conceit that some parts of it are more *Diaphanous*, some more *opake*. Who hath not heard how *Scheiner* looked on the *Moon* in an *Eclipse*, and did conceive it was *fistulous*, (at least *translucid* in part) and so did transmit the light thorough several *Cavities* in some places, whilst others, not *directly* subject to the *Sunne*, are *obscure*. They cannot agree whether the Spots of the *Moon* be *more bright*, or *obscure* in an *Eclipse*. The *observations* and *descriptions* of the *Moon*, made by *Galilæo*, *Scheiner*, *Fontana*, *Schottus* upon *Kircher*, &c.

Berigardus Circul. P. fo. de Luna id. b

&c. are ſo *defective*, that we muſt repute them but as the firſt *rudiments* of an *intended* Science. And as for the deſcriptions of the *Phaſes* of the *Moon*, made by *Langrenus* and *Hevelius*, however there be many things in which they *all* agree: yet the *Teleſcopes* of *Ricciolus* (made by a *Bavarian* Artiſt) and of *Franciſcus Maria Grimaldi*, either rectified the *miſtakes*, or repreſented many *Phænomena* different from thoſe delineated by *Galilæo*, *Fontana*, *Torricellius*, and *Manzini*, viz. *Lunaris faciei partes omnes magnas, mediocres, ac minimas ſingillatim Teleſcopio intuens* Grimaldus, *eaſque ſtatim cum* Langreni & Hevelii *Schematibus comparans, deprehendit multa quidem egregie ab iis peracta, non pauca tamen ſupereſſe, quæ aut addenda, aut quoad ſitum, magnitudinem, figuram, ſymmetriam, nigroris aut claritatis differentiam corrigenda forent.* Such as reject the *exact Sphericalneſs* of the *Moon*, introduce *Aſperities* and *inequalities* in the *ſurface* of it, which ſome explain by *Mountains*, *Valleys*, and *Waters*: but concerning the parts of the *Moon*, which might be *Water*, and which *Land*, our *Obſervators* did differ. *Galilæo* believes the *ſpots* or *obſcure parts* to be *water*. *Kepler* held the contrary, that the *bright parts* were *water*, and pretends to demonſtrate it out of *Opticks*. though afterwards he changed his opinion for that of *Galilæo*'s, which is generally received. As to thoſe *aſperities* in the *ſurface* of the *Moon*, whether they extend to the *Limbus*, or utmoſt circumference, or no, is a doubt amongſt *them*: *Galilæo* denies it; *Kepler*, *Ricciolus*, and others affirming it: and the latter gives this reaſon why they are leſs frequently obſerved there: *Vera cauſa cur raro aſperitas illa Limborum videatur, eſt partim imperfectio Teleſcopii, &c.* Neither are they better ſatisfied about the *Atmoſphear* of the *Moon*: that there is *one*, *Galilæo*, *Kepler*, *Antonius Maria de Rheita*, *Kircher*, *Cyſatus*, *Scheiner*, with others do avow: and *Langrenus* ſaith, that we may obſerve it with a *Teleſcope*: *eandem Tubo-ſpecillo conſpici affirmat* Michael Florentius Langrenus. But others *deny* it as peremptorily.

Ricciolus Almag.nov. l. 4. c. 7.

Glailæo ſyſtem.coſmic. p. 131. edit. *Londin.*

Kepler. Aſtronom. Optic. c. 6. ſect. 9.

Ricciolus Almag nov. l. 4. c. 8. qu. 2.

Kircher. iter exſtat. cœleſt. p 48.

Ricciolus Almag. nov. l. 4. c 6. ſect. 8.

Interim

Ricciol. Almag. nov. l. 4. c. 2. sect. 3.

Interim mihi (saith *Ricciolus*) *nondum quocunque Telescopio adhibito aer hic ita patuit, ut illum potius prope ac circa Lunam, quam in aere nostro, in quo & Halones fiunt, cogar agnoscere.*

Zucchius phil. optic part. 1. c. 17. sect. 9. p. 264.

And *Zucchius* at large proveth this Corollary, *Non elevantur vi luminis Solis vapores e Luna, sicut elevantur ex Globo e terra & aqua integrato: Neque datur circa Lunam Sphæra vaporosa ulla, qualis circa dictum Globum deprehenditur.*

Having proceeded thus far, I shall take notice of some *extravagant* opinions that possess many of our *Comical wits*, and their *Associates* or *Admirers*, which are extended to the prejudice of *Christianity*, and the growth of *Atheism* in this *Age, viz.* That the resemblance betwixt the *Moon* and the *Earth* is such, that it is a *Terraqueous Globe* inhabited by *men*, and they hereupon concern themselves about their *Progeny, Salvation, &c.* I shall from hence take occasion to instruct those *phantastical* persons, that even *Hevelius*, who accommodated the *Terrestrial Geography* to the *Lunar Globe*, and seems to conclude that the *illuminated* part is *earth*, the *darker* is *water*: yet did it only because He knew no fitter comparison amongst sublunary bodies. ——*Non est autem quod quispiam ideo existimet Lunam ex ejusmodi sabulo, luto, aut lapide esse compositam, ut hæc terra nostra, siquidem fortassis ex alia poterit constare materia, ab imaginatione nostra prorsus diversa, & modo adhuc incomprehensibili.*——*Minime etiam hasce Lunares aquas nostris similes assero, sed quod nihil quicquam similius, propter magnam utrarumque affinitatem hic in terra habeamus, cum quo illas comparare valeamus.*

Joan. Hevelius Selenograph. p. 148.

It was *indiscreetly* done of *Kepler*, *Kircher*, *Hevelius*, and such Writers to carry on the comparison so far, the resemblance betwixt the *two Globes* being so little as the most *unprejudic'd* persons findit to be. *Hevelius perinde acsi Luna esset altera tellus, Geographica nostratis Telluris nomina in Lunam transtulit: licet quoad* figuram, situm, symmetriam, &c. nulla *fere sit* Analogia *inter utriusque superficiem.* The truth whereof will further appear from those *considerations* which the inquisitive *Zucchius* after *thirty five years* use of *all manner* of *Telescopes* at length fixed upon, *viz. That the discrepancy of Parts in the illuminated Moon may be explained with-*

Ricciolus Almag. nov. l. 4. c. 7. p. 203.

Zucchius phil. opt. part. 2. c. 17. sect. 9. corol. 7. p. 266.

out

out attributing thereunto any variety of colours: *yea, it ought to be ſo explained.* The firſt part of which Aſſertion he proves thus: becauſe in *Opace bodies* the difference of a greater and leſſer Obliquity in their ſcituation towards the body that ſhines upon them doth cauſe a diverſe manner of *illuſtration.* Thus the ſame wall, of one uniform colour, according as it is differently illuminated, ſeems in ſome parts to be *white,* in others *pale*, in others *dark-coloured*, and *black*: beſides that, a greater or leſſer *aſperity* or inequality of the ſuperficies may cauſe an intermixture of the *enlightned* and *over-ſhadowed* parts, and ſo create different appearances of *light* and *opacity* in their moſt *obſervable* parts.

The ſecond part He proves thus: becauſe that the face of the Moon being looked on with a *Tube* of an *extraordinary length,* with Glaſſes *excellently poliſhed* (ſuch as *He* uſed for many years) appears *all of it* like a great Tract of Land covered over with *Snow,* which the Sunne variouſly illnminates accordingly as the parts are differently framed and ſcituated. Where there is any change of ſcituation in the parts illuminated in reference to the body that irradiates them, then do ſuch parts *abate of their whiteneſs*: and although they ſtill continue in ſuch a poſition that his beams may in ſome degree and manner reach them, yet by reaſon of the *unequal ſurface* of the *Moon* (in which ſome parts are more elevated then others) ſome parts are *directly oppoſite* to the *Sunne,* others are glanced upon with an *oblique ray,* and this mixture of *ſhades* and *brightneſs* occaſions thoſe ſpots which we ſo talk of. Thus upon the *libration* of the body of *Jupiter,* the *girdle,* which otherwiſe ſeems *remarkably black* above the other adjacent parts of the Planet, becomes like unto the reſt of the body in *whiteneſs*, and ſo *diſappears.*

As to the diſtinction of the Moon into *Sea* and *Land, conſiſting of Mountains and Valleys*; although the *Analogy* may ſeem *allowable* by reaſon of the *Aſperities* in the *ſurface of the Moon,* (which is a thing not to be denied: albeit that the calculation of the *heighth of thoſe more elevated parts* are ridiculous, except the *nature* of the *Cavities* were better

Exiſtimo materiam globi lunaris non conſtare terra & aqua *Galilæo* ſyſtem. cosmic p. 132.

to

Zucchius phil.opr.part. 1.c.17.sect.9 p.260,261.

to be discovered, as *Zucchius* shews) yet the imagination of *Seas* and *Lakes* therein, or any thing *of that Nature*, except what borders upon the *Peninsula deliriorum* in the *Lunar Chart* of *Ricciolus*, 'tis all an *improbable phancie*. For, that the *more pale* and obscure *spots* are not *water*, appears hence, that those *spots* keep the same *Phasis* or appearance for many days, though the *Site* of the *Moon*, both in respect of the *Sunne*, and of *us the Spectators*, do vary much in that time: whereas when the *Sunne* casts his *beams* upon *Seas* or *great waters* on *Earth*, the *Phænomena* differ according as the *Sunne*, or the beholder vary their *station*: And this alone might convince us, but that I finde now in *Zucchius*, viz *Similiter transitum successivum radiis Solis ad fundum usque ad magnis maculis intra margines illustriores contentis præbent* (ut diximus in apparentiis, pag. 239.) *quod non evenit in liquido profundo instar aquæ, ut in aquis experimur etiam in multa vicinitate illustratis, quando notabilem habent profunditatem: tum quia constantem inæqualitatem illustrationis exhibent in horizonte Lunari, & quidem, juxta dicta in Apparentiis* (num.3.) *secundum magnam extensionem illustratam, intra reliquas partes nondum Solis radiis perfusas; imo aliquæ, Soli proximiores, alias sequentes in eadem majori macula inumbrabant: hujusmodi autem convenire non possunt corpori inconsistenti, & liquido aquam referenti, quæ tamen certum est convenire aliquibus Lunæ partibus, ab omnibus inter maculas computatis.* I must confess I think these *reasons* convincing to any persons not prepossessed; and they are much more inforced by *him* with a *discourse* concerning *exhalations* and an *Atmosphear* about the *Moon*, which he denies *absolutely*: yet considering the proportion of the *imaginary Waters* to the *Land* in the *Moon*, and the *heat* and *continuance* of the *Sunne-beams* thereupon, common reason would tell us, that the *vaporous exhalatious* would *proportionably* exceed those about the *Earth* here, and produce an *Atmosphear* that should be *observable*, whereas the most accurate inspection at most opportune times with the *best Telescopes* could not satisfie *Zucchius*, that there was *any such thing at all*.

Zucchius ubi supra p. 263.

Galilæo professeth, that in the *Moon* there is no *rain*; no *clouds* there thicken the air. *Longis ac diligentibus observationibus nunquam id animadvertere potui, ac semper uniformem purissimamque serenitatem ibi deprehendi.* *Galilæo.* system. comm. p.133. *Zucchius* ubi supra p.264.

Kepler

Kepler (and his Maſter *Mœſtlinus*) did believe that the *Moon* was a *World* conſiſting of *Sea* and *Land*, making up one entire *Globe*, as the *Earth* does; and that the *Mountains* there were much higher and bigger *comparatively* then thoſe of the *Earth*: and adds by way of *jocundry*, that ſince the *Men* and other *Animals* commonly participate of the nature of the *ſoyl* and *climate* they dwell in, that the inhabitants of the *Moon* muſt be of a *greater ſtature*, and *more robuſt conſtitution* then thoſe of the *Earth*: The *Day* there making up *fifteen days* of ours: and the *Heats* ſeem ſo *ſcorching*, and ſo *unexpreſſible* by reaſon of the *Suns* being vertical to *them* ſo long. In fine, *he* thinks it no abſurd opinion of the *Gentiles*, that made the *Moon* a kinde of *Purgatory for departed Souls*.

Kepler Aſtronom Optic. c. 6. ſect. 7.

Upon the moſt *ſerious conſideration* of all circumſtances, whereunto I could ever engage my thoughts; when I reflected upon the great difference betwixt the *Days here* and *there*; the different influence which the *Sunne* muſt have *here* and *there* through the Diverſity of his Aſpects, (whereupon depend *Terreſtrial* productions) that there is no *rain*, no *clouds* there; no *Atmoſphear* (like ours) proportioned to ſuch *reſpiration* and *life*: no intermixture of *earth* and *water*: no *innate diverſity of colours*, which occaſion the *Phænomena* that perplex our over-curious Mortals: and that all the *Enquiries* hitherto made, have ſo little of *evidence*, that 'tis *more clear* that the

Galilæo ſyſtem Coſmic. p. 132. *Exiſtimo materiam Globi Lunaris non conſtare terra & aqua. Quæres una ad generationes alterationeſque noſtris ſimiles tollendas ſufficit. Verumtamen etiamſi concederetur Aquam ibi Terramque dari; non tamen plantæ & animalia noſtris ſimilia naſcerentur, idque ob duas præcipue rationes: primo quia ad noſtras generationes aſpectuum Solis varietas adeo neceſſaria eſt, ut ſine illis eſſe nullæ poſſint. Jam autem habitudines Solis ad Terram, ab illis quæ ſunt ad Lunam, valde differunt. Nos quoad illuminationem diurnam, in majori parte terræ, ſingulis horarum viginti quatuor periodis, noctis atque diei viciſſitudinem experimur, quæ in Luna menſtruo demum ſpatio abſolvitur. Item ille Solis in Zodiaco deſcenſus & aſcenſus annuus, qui hiemis æſtatiſque viciſſitudinem & dierum ac noctium inæqualitatem producit, in Luna unico menſe finitur: Cumque Sol apud nos ſic elevetur ac deprimatur, ut inter maximam ac minimam altitudinem intercedat differentia graduum, 47. quanta nimirum eſt diſtantia ab uno tropico ad alterum; in Luna non niſi 10 gradibus aut paulo amplius illa differentia conſtat, quanta ſi licet eſt maxima latitudo Draconis ultra citraque Ecliticam. Nunc conſideretur qualis operatio ſit futura Solis in Zona torrida, ſi per quindecim dies continuos radiis ſuis eam ferire pergeret. Per ſe enim intelligetur, omnes plantas, herbas & animalia poſſum itura. Quod ſi vel maxime generationes ibi fierent, illæ tamen ab herbis, plantis, & animalibus noſtratibus diverſiſſimæ forent.*

Secundo perſuaſiſſimum eſt mihi, nullas in Luna pluvias eſſe. Nam ſi qua parte nubes ibi congregarentur, ut fit in terra, videremus utique rerum illarum aliquid alſondi, quas ope teleſcopii in Luna conſpicimus: & in ſumma, in particula aliqua nobis variaretur aſpectus. Id quod longis ac diligentibus obſervationibus nunquam animadvertere potui, ac ſemper uniformem puriſſimamque ſerenitatem ibi deprehendi.

Moon is a *Cheese*, (not *fat*, for then it would *melt*) odly figured and made with *Asperities* in its *Superficies* (and perhaps a *little vitrified* in some parts) then an *Earth resembling ours*: I could not but condemn those our *Comical* and *Atheistical Wits*, who use so little of *modesty* or *scrupulousness* in their discourses about this *so uncertain subject*. They are men of so *little reading* and *inquisitiveness* (whatever they pretend unto; as if this Nation produced no persons equal to them for *Learning* and *Abilities*, that they never examined *these debates*; but the *opinions* which they take up and transform into *Assertions*, are onely the *raillery* or *casual* and imperfect *pieces of conversation* betwixt *more intelligent* persons, or some *Coffee house talk*, which they confidently obtrude and *impose* upon *speculative* or *more considerate Gentlemen*, and render themselves insupportable in any Society.

A young *Gentleman*, a friend of mine, who was not a little valued in the world, who was no stranger to the *Mathematicks*, and whose *wit* and *learning* far transcended any thing I can observe in a *droll* and *Comedians* of these times, entertain'd me with a discourse once of this nature; Having spoken of the Celestial *Phænomena*, how differently they were represented by *sundry men*, he was more prone to suspect their *dioptrick Tubes*, then *their integrity*: He thought our *Eyes* were *Telescopes* of *God Almighty*'s making, and the model by which the others were regulated and amended: and that any man who regarded the *daily Occurrents in vision*, could never believe it possible, that any *certainty* could be derived from *Telescopes*, about such *Phænomena* as we could employ only *one sense* about, and that not in a *due distance*, and with such circumstances as *legitimate* the *judgement* thereof: That we were to look through *their different mediums* (granting that our *Air* makes but *one Diaphanum*) and those not contrived *dioptrically*, that we know, and that since every *medium*, *thicker* or *thinner*, (besides the intercurrencies of *irregular* and *unknown* particles, like to *moats* in and upon a Glass) did cause a *different Refraction*, and that neither the constitution of our *Atmosphear* (as not proportionate to our *sensible* enquiries) and *air*, nor the *intermundial Æther*,

Tubus lentibus duabus constans dici potest oculus mere artificialis Scheiner Rot. Ursin. l 2. c. 7 quem vide ib. a c. 23. usque ad c. 30.

Tam raritas quam densitas potest esse causa refractionis. Mersenn.

nor

nor the *Sphæra vaporosa* of the *Planets* could ever be *accurately* and *satisfactorily* searched into; no man could *particularly* know what he *beheld*, and deduce *with prudence* any *theoremes* and *conclusions* from such *infirm hypotheses*. He added, that *our senses* and the *daily objects* we converse with on earth, did *prejudicate* rather then qualifie us for *these speculations*: that we might easily observe what *mistakes* arise from the coutemplation of *resemblances*: that *similitudes*, though very *slender*, engage the *unwary*, (and some that are cautious too) to conclude an *identity* in *objects*: that it would be impossible for any man without the aid of a *nearer approach*, and even of his other *senses*, to conclude whether a *stick* lying part in, part out of the *water* were *streight* or *crooked*, by reason of the *refraction* in the different *mediums* of *Air* and *Water*: and that a *Glow-worm*, or an *Indian fire-Fly* would create strange *disputes* and *contests* amongst mankind, had they no other helps to discover the *Phænomenon* then a *Telescope*, magnifying the *object* and its *parts* thirty, fourty, or one hundred times. He admired that saying of *Aristotle*, περὶ τῶν θεσνίων ὁμονοεῖν ἐκ ὅτι τ φιλιάς: and commended *him*, that in his doctrine of *Meteors* he pretended not to arise higher then a low *degree* of *probability*. That it was possible to imagine such things to our selves as were not really in the *Moon*, but not *such* as *were there*, except in a very general and *indefinite* manner. *Posse quidem excogitari nonnulla, quæ in Luna neque sunt, neque esse possunt: nihil autem eorum quæ ibi sunt aut esse possunt, nisi largissima generalitate.* That the appearance of an *Earth*, did not infer the *inhabitation of men*, much less *Animals* and *Plants* like ours: that our own *Geography* might undeceive us herein, some parts of *this Globe* being not *peopled*, and the *animals*, and *plants*, and *nature of the soyle*, differing so much from our *European* productions, as we *could not have conceived*, had not our *Eyes* and *authentick testimonies* gained us to a *belief* of it. That the most *clear Eyes* have in this case a kinde of a *suffusion*, and the most *unbiassed persons* their *Intellectuals prejudicated*, and had no reason to condemn the opinion of that Peasant, who imagi-

Arist meteor. l. 1. c. 4. sect. 2. These are the words, and thus the judgment of *Galileo Syst. Cosm. p.* 7. Ὁ περὶ τῆς μεγάθους ἢ τῆς σχολαίοτητος λέγοις τὴς, καὶ γινώσκοις ὡς ἔχει, εἰ ἀν αὐτῷ τῷ λέγοντι, οὔτε τοῖς ἀκούσι δῆλα ἂν εἴη, ἔτε ἀληθέα ἐστὶν, εἴτε μὴ· ὁ γὰρ ὅτι πρὸς ὅπη καὶ ἐπιτύγχανται εἰδέναι τὸ σαφες. Hipocr. *de vet. med.* sect. 3.

ned the *Grandeur of Rome* to be like unto his *Village*, or the *Scot* who represented *London* to be such another town as *Edinburgh*. It is an opinion wherein the *Peripateticks* and *Lyncei* are agreed: *Quicquid sub nostram cadit imaginationem, id aut jam ante viderimus oportet, aut ex rebus rerumve partibus jam ante visis compositum sit, quales sunt Sphynges, Sirenes, Chimeræ, Centauri, &c.* He smiled at those who thought they had much improved *solid knowledge*, by telling men of *Quasi-terra*, *Quasi-mare*, *Quasi-sylvæ*, which *he* supppos'd to be as insignificant termes as the *Canting* of *Chymists*, or the *Quasi-corpus*, and *Quasi-sanguis*, in the gods of *Epicurus*: that it was intolerable in a *Philosopher* to *phrase* it thus, however a Poet might say,

Galilæi system. cosmic. P. 77.

Ἰχὼρ, ὁιός περ τε ῥέει μακάρεσσι θεοῖσι

But nothing created in him a greater *laughter*, then the Proposals some made of *flying to the World in the Moon*: this design he thought *superlatively* ridiculous, though the contrivance of *wings* for *mankind* were then but projecting at *Wadham-Colledge*: It did not appear to him then that *this World* was no *Magnet*: he wished that first these *Opiniatours* would go to both *Poles*, and placing themselves there try the Observations of *Des-Cartes* with some dust of *Iron*: that they would consider whether the more *remote Air* would bear up their *wings* and *weight*, (perhaps there might be that difference in *Air* that there is in *water*, where those *Ships* which *sail* in *salt-water* do sink in *fresh streams*) and how it might agree with their *respiration*, since the *Air* upon the tops of *Andes* of *Peru* is so sharp, that those Mountains are as difficult to pass, or live upon, as *Aristotle* represents *Olympus* to have been, where men are forced to breath through *Sponges*: whether that *inhability* of the *Air* for men to breath in it did arise from the *real nature* of so *elevated* a place, or that it was occasioned by some *destructive exhalations* (since Mount *Athos* is reputed higher then *Olympus*) he knew not: but he thought they might enquire well into this particular, and into those regions (which are different) wherein *storms*, *thunder*,

Vide *P. Alph. Ovag'ium* in relatione *Chilensi* c. 5. *Ricciol* Almag nov. in append. ad part. primam tomi primi, p. 730.

thunder, and *snow* are generated; what *tempests* might arise therein (of which we are not sensible here below) what *provision* there is against *them* before one arrives at the *twelve Celestial houses*: what accommodation of *meat* and *drink*, what *money* currant in those parts, all which ought to be regarded lest our *Experimentators* should come off as ill as the *Knight of the Mancha* did, when he had not wherewithal to defray the *expence* of his *Inne*: besides that, he was much afraid, that at their arrival, agreeably to what *Kepler* saith, they might finde their *lodging* too *hot* for *them*.

Concerning a *voyage* to the *World of the Moon*, the *difficulties* of the *passage* and of the *air*, *water*, and other circumstances there, read *Kircher* his *Iter exstat.* unto the *Moon*; and you will find how just a *caveat* I give here.

Having said these things, that *great young man*, (who died before that *Ignorance* and the *Virtuosi* grew *prevalent*) presented me with the works of *Marcus Aurelius Antoninus*, published by *D Meric Casaubon*, opening it at that place where that understanding *Emperour* acknowledgeth it to have been the special favour of the *Gods*, that he never troubled himself about these *Meteorologies* and *extravagant speculations*, whereunto nothing *humane* can reach: He added, that in *these kind of speculations* he knew *enough* that was secured from *superstition*, that for a man to desert those *Studies* which qualifie him for a *sociable life*, and were of importance to the preservation of the *Government* and *Countrey* he lived in, this was a kinde of *salvageness*, had more of the *Anchorete*, then of *Civil Prudence*, and was to be encouraged in a *Cloyster*, or in the deserts of *Thebais*, then to be made a practice among *wise Statesmen*.

I have somtimes entertained my self with the *remembrance* of this *Gentleman*, and guessed how *he* would have *sported* it that passage of Mr. *Glanvill*, in his *Scepsis Scientifica*, where he complements the R. *Society*, to whom that book is Addressed.

We expect greater things from *Neoterick* Endeavors. The *Cartesian Philosophy* in this regard hath shewn the World the way to be happy. And methinks *this Age* seems resolved to bequeath *Posterity* somewhat to *remember* it. The glorious Undertakers

Scepsi Scientif. p. 133, 134

kers, wherewith Heaven hath bleſt our days, will leave the *World* better provided then *they* found it. And whereas in former times *ſuch* generous free-ſpirited *Worthies* were as the Rare newly-obſerved *Stars*, a ſingle one the wonder of an *Age*: In ours *they* are like the *Lights* of the greater ſize, that twinkle in the *Starry Firmament*: And this laſt *Century* can glory in numerous *Conſtellations*. Should *thoſe Heroes* go on as they have *happily* begun, they'll fill the World with *Wonders*. And *I* doubt not but *Poſterity* will find many things, that are now but *Rumours*, verified into (a) *practical Realities*. It may be ſome *Ages* hence, a Voyage to the (b) *Southern* unknown *Tracts*, yea, poſſiblie the *Moon*, will not be more ſtrange then one to (c) *America*. To them that come after us, it may be as ordinarie to buy a *payr of Wings* to flie into *Remoteſt Regions*; (d) as now a pair of *Boots* to ride a *Journey*. And to conferre at the diſtance of the *Indies* by *Sympathetick* conveyances, may be as uſual to future times, as to us in a *literary correſpondence*. The reſtauration of *Gray hairs* to *Juvenility*, and renewing the *exhauſted marrow*, may at length be effected without a *Miracle*. And the turning the now comparative *deſert World* into a *Paradiſe*, may not improbablie be expected from late *Agriculture*.

Now thoſe that judge by the narrowneſs of former *Principles* and *Succeſſes*, will ſmile at theſe (e) *Paradoxical Expectations*: But queſtionleſs, thoſe great *inventions*, which have in theſe *latter Ages* altered the face

a God forbid.
b 'Tis very cold going thither, if you believe Sir *Fr. Drake*; as I have shewed afore in my discourse of the *North-west-passage*.
c Yes a little more; the Ancients had been there before; besides, the difficulties ingoing to the *Moon* are more *insuperable*.
d *Pacolet's* Horse; *Fortunatus's* wishing-Cap; the skill of *Medea* in restoring *youth*, all *ancient* and *modern* fables shall be really atchieved!
e They that do not so, laugh at *you*, and think such *expectations* thence *paradoxical*.

face of all things, in their naked *Propolalls*, and meer *Suppositions*, (*f*) were to former times as *ridiculous*. To have talked of a *New Earth* to have been *discovered*, had been a (*e*) *Romance* to *Antiquity*: And to sail without sight of *Stars* or *Shoars* by the guidance of a *Mineral*, a storie more absurd then the Flight of *Dædalus*. That men should *speak* after their *tongues* were *ashes*, or communicate with each other in *differing Hemi spheares*, before the invention of *Letters*, could not but have been thought a *Fiction*. *Antiquity* would not have believed the almost incredible force of our (*h*) *Canons*; and would as coldlie have entertained the wonders of the *Telescope*. In these we all condemn (*i*) *antique incredulity*, and 'tis likelie *Posterity* will have as much cause to pity *ours*. But yet notwithstanding this *streightnesse* of shallow *Observers*, there are a set of (*k*) enlarged Souls that are more *judiciously credulous*, and those who are acquainted with the fecunditie of (*l*) *Cartesian Principles*, and the diligent and ingenious Endeavours of so many true *Philosophers*, will despair of (*m*) *nothing*.

This is a most *extraordinary Flourish*: Yet I finde the *Rhetorick* defective in the suiting of the *Antitheses* and *Antapodoses*: but I shall not take notice of that fault now, it is so general in our *Comical Wits*. I shall now quit my Digression, and resume the controversie betwixt the *two Disputants*. Mr. *Glanvill*, for the credit of those *Dioptrick Glasses*, told Mr *Cresc*. "*That* he *might try them upon* Objects near, "*and* easily visible, *by the* unassisted sight; *and if he made* "triall, *he would finde they altered the* Objects *in* nothing *but* "*their* proportions, *which are represented* larger *for the advantage*

f Prove that they ever did think of them: if they did not, they could not be *ridiculous* o *them*.

g Enquire into the Navigations of *Antiquity* and then say this.

h The strangeness is more in the incredible force of the *powder*: had they known that, they would not have thought the other *strange*.

i I know not any that condemns the ancients for *incredulity* about *such matters* as were never propos'd unto them, but for the *credulity* of this *Age*, expect *scorn* rather then *pity*.

k 'Tis a pretty *philosophy* indeed, it is all *Inversion*.

l Not of the *Paracea*, not of the *philosophers stone*, nor any thing in *Ovids Metamorphesis*, *Atlantis*, or *Utopia*

" *vantage of* vision *in things* small *and* remote; *and we have* all " the like reasons *to distrust our* Eyes, *as these* Glasses (*for* " *their* informations *are the* same *in all things, but the men-* " *tioned difference*) *and there is no man such a* fool *as not to* " *make allowance for* that.—— I see Mr. *Glanvill* is not only ignorant of the *Opticks*, but altogether unacquainted with *Telescopes*: for first there are some made by Mr. *Smithwick* (a very *ingenious and worthy man*) which represent the *Phases* of the *Moon* very well, and yet *invert* all *Objects*, but that is no default or impediment where the thing looked on is *round*. These *convex Telescopes* alter the *Object* in some thing else besides their *proportions*: nor doth any such thing happen in a *well-disposed Eye* upon *vision*. Secondly, he might have known this further *difference* betwixt an *un-assisted sight*, and what is performed by the *best* and longest *Telescopes* about ordinary Objects, that the *Dioptrick Tubes* do represent the *light* and *colours* of bodies more *dilute* and *remiss* then they appear to the *naked Eye*. *Per Telescopia, præsertim longiora, objecta spectantur luce & colore dilutiora, quam libero oculo.* This is granted by *Zucchius* and others; and the reason is given by *Zucchius*, because that so great an *expansion* or *amplification of the Object*, and distancing of its parts one from the other, is equivalent to a *remission* of those *qualities* therein. But to shew Mr. *Glanvill* a little more of his ignorance in *Telescopes*, I shall shew him some further differences betwixt the *naked sight*, and what is performed by those *Glasses*. For some of them represent some *Objects* greater then they appear to the *naked eye*: Some (in the *shorter Tubes*) are represented *no bigger*, or rather *less* then they otherwise seem: Some *Objects* in the *longer Telescopes* are magnified indeed, but *nothing so much* as other *Objects* are by the same *Glasses*. The Experiments

Duobus vitiis convexis instructo Telescopio, habetur simul & semel objecti mediocris, vel multarum partium grandioris repræsentatio, sed inversa: si debite addatur tertium convexum, multiplicatis adhuc refractionibus, una unius obtinetur apparentia, & in situ conformis Objecto. *Zucchius* phil. opt. part. 1. c. 17 sect. 2. p. 180.

Zucchius ubi supra p. 181.

Expansionem repræsentativorum æquivalere remissioni, & densationem eorum intensioni, & utramque non à medio, sed à propria conditione propagationis radiorum pendere. *id ib.* Si Telescopium sit extraordinariæ longitudinis, ex nimia expansione, quæ æquivalet remissioni qualitatis visibilis, apparet nimis dilutum: ut minus in eo varietas partium internosci possit. *Zucchius* phil opt. p 2. tr. 3. c. 7 sect. 5. p 366.

Zucchius phil opt. part 1 c. 17. sect. 6 p. 204

ments are obvious: place a *candle* in the dark at ſome conſiderable diſtance, and the flame will appear *round* and *encompaſſed with rays*: then take a ſhort *Teleſcope* fitly made and placed, and look through it, and you will ſee the irradiation taken off, and the flame repreſented as *oblong*, not *round*, and rather *ſeemingly leſs* then *greater* then it appeared before to the *naked Eye*. Then turn your eye unto any *coloured Object*, and take notice how big it ſeems: aſſume the ſame *Teleſcope*, and you ſhall find that to be magnified above what it ſeemed to the *naked eye* by much. After this, take a long *Teleſcope*, and view the aforeſaid *candle* through that; and at the ſame diſtance view ſome other *coloured Object*, and you ſhall ſee that this laſt *Teleſcope* will repreſent both *Objects* much *magnified*; but the *Candle* leſs of the two *by far*.

But I ſhall adde further, that it is not to be doubted but that the *Teleſcopes* of *Galilæo*, *Scheiner*, *Rheita*, *Gaſſendus*, *Grimaldi*, *Euſtachio* Divini, *Hevelius*, *Hugenius*, *Ricciolus*, and *Zucchius*, were good *in their kind*, and that they did repreſent *Objects* as truly here *on earth*, as *any* could; yet when they come to be applied to the *Celeſtial Phænomena*, what *difference* is there in their *Obſervations*? How do they *complain* either of the default of the *Teleſcopes*, or want of *care* or *skill*, each in the other? *Simon Marius* boaſts of his accurateneſs: *Scheiner* in his *Apelles* tells us, *Obſervationes omnes factæ ſunt ſummo ſtudio cœlo ſereniſſimo, ſemper cum obſervatum eſt, & obſcuriſſimo, plerumque in abſentia videlicet Lunæ: talis vero variis & excellentiſsimis, quorum uno meliorem adhuc ad ſtellas non vidi.* But enough may be collected to this purpoſe out of the foregoing diſcourſe, ſo that I need not repeat it over again: out of all which as I would not be underſtood *totally* to diſcredit the uſe of *Teleſcopes* in *celeſtial diſcoveries*, (I do not

Si Lunares diſcos, poſt tot inſpectores, & inſpectiones publicatos videas, neque numero, neque conformatione ſibi correſpondent: quam multæ partes vel præ aliis circumpoſitis illuſtriores interjectæ & ſua multo minori illuſtrationis exhibitione illas interrumpentes, aliquos latuerunt, & in anguſtioribus, vel minus accuratè expreſſis. Diſcis omiſſæ, quæ verè internoſcibiles ſunt in luna, & ab aliis conſignantur? quantum totius Diſci lunaris terminatio, & inſigniorum in ea partium, variata? Zucchius phil opt. part 1. c. 17 ſect 8. p 253.

Vide Scipion. Claramont. de Univerſ. l. 3. c. 8.

deny but *ſome things* and *ſome motions* are obſerved *by them*, which a *naked Eye* cannot diſcern; but this *knowledge* arrives to a ſlender degree of *certainty*, when the *Phænomena* come to be *particularly* explicated; and *theoremes* or *aſſertions* framed there) ſo I would not have them *too much relied* on, nor men be too confident in *principles* and *Concluſions* which have no *ſurer Foundation* then thoſe *probabilities*: and I do herein joyn with *Claramontius* in that *Epiphonema*, *In tanta diverſitate, quid certi ex tubo Optico habemus?* If I muſt ſuſpect the *skill* or accurateneſs of *Galilæo*, *Scheiner*, *Gaſſendus*, *Hevelius*, *Fontana*, *Ricciolus*, and *Zucchius*, and ſuch like; pardon me, if I know not *whom* to believe.

I have been the more large in this Point becauſe of the *inſolence* with which Mr. *Glanvill* perſecutes that *Reverend*, and otherwiſe *learned* perſon, whom he repreſents to the world as *He* pleaſeth, and accordingly treats him with that *contempt* and *ſcorn* which is leſs allowable towards a *Divine*, and ſuch a one as is, and always hath been in that Countrey very much eſteemed by ſeveral *honourable* Families, as well as others. However God hath ſo *providentially* ordered the *diſpute*, thereby to check the *pride* of our *Virtuoſo*, that *The Man of Words* cannot triumph over the *Man* of Axiomes. And if it be true, that our *Ariſtotelean* was *amazed* at the hard words of *Dioptrick Tubes*, &c. as if there had been *Magick* in them: I doubt not to *Juſtifie Him* in it; for the inſolent *Virtuoſo* made uſe of *them*, not as became a *knowing perſon*, but as *Conjurers* uſe *ſtrange termes*, and of an *uncouth ſound*, though perhaps really *Hebrew*, *Latine*, or *Arabique*.

Beſides all this, perhaps Mr. *Croſs* ſeems to have been offended at ſomething in that mixt *diſcourſe* or *diſpute*, that might derogate from the *Authority of the Scripture*: many ſayings are not *innocent*, but as they are *worded* or *uttered*. To ſay *the Scripture was written to mens fancies* is an expreſſion very *unwary* in a *Divine*: although a *convenient* interpretation may *excuſe* it. To ſay *it is not written according to vulgar Methods* may ſo be ſpoken, that the *action* may render the words *culpable*. And in *another Age* they might

have paſſed better then *now*, when men are prone to *vilifie the Scripture*, eſpecially the *little Wits*. I perceive Mr. *Sprat* is not over-tender of the dignity of the *Scripture*: for although there be an *ancient Canon* of the Church againſt the applying the *Sacred Word of God* ad *ſcurrilia & adulatoria* (which *Canon* is authoriſed even by the *Council of Trent*) yet doth he encourage men to apply it to ordinary *Raillery*. "*The* Wit *that may be borrowed from the* Bible *is magnificent,* "*and as all the other Treaſures of knowledg it contains, inexhau-* "*ſtible. This may be uſed and allowed without any* danger of "prophaneneſſe. *The Ancient Heathens did the ſame. They* "*made their Divine Ceremonies, the chief ſubjects of their phan-* "*ſies: by that means their Religions had a more awful im-* "*preſſion, became more popular, and laſted longer in force then* "*elſe they would have done, And why may not* Chriſtianity "*admit the ſame thing, if it be practiſed with* Sobriety *and* "Reverence. *What irreligion can there be in applying ſome* "*Scripture-expreſſions to* Natural things? *Why are not the* "*one rather exalted and purified, then the other defiled* "*by ſuch Applications?* —— The Caſe is clear *Gentlemen*, Hath not the Lord ſaid, *What haſt thou to do to take my words into thy mouth ſince thou hateſt to be reformed?* Beſides, methinks our *Divine* might have remembred the feaſt of *Belſhazzar*, and the reſentment that the *Lord* expreſſed upon the applying of the *conſecrated veſſels* to the ſerving in a *feſtival banquet*, though to a *Prince*. He might have called to minde *the hand-writing upon the wall*, and very probably have inferred with himſelf, that if *God* was ſo concerned at the miſapplication and abuſe of thoſe *Temple-Veſſels*, he would much more ſeverely intereſs himſelf where that *Word* of his, which he hath ſo many ways *hallowed* and recommended to our *Veneration*, is abuſed to *raillery*: This *Humour* is no part of the *words* or *works* in which the *Man of God* is to be *perfected* by reading of the *Holy Scripture*. I fear the *great Judge* will one day ſay unto theſe *Drolls*, *Ye are weighed in the ballance, and found too light*. To conclude, the generality of *Raillery* amounts to no more but ſo many *idle words*, and *they* become *doubly criminal* by being *profane*.

Plus ultra Page 414.

But this practice of theirs was the ruine of their *Religion*, as any man may judg who ſees what uſe *Clemens Alexandrinus* and *Lactantius* make of it againſt *Paganiſm*. And the *Greeks* thought ſo when they puniſhed one, ὅπερ ἔξω ϛ χήματο τὰ Εὐσέβεια.

Of the *Antiquity* and *Use* of *Chymical Physique.*

Plus ultra, Page 10, 11.

"CHymistry *hath indeed a pretence of the great* Hermes *for* "*its* Author,(*how truly I will not dispute.*) *From him 'tis* "*said to have come to the* Egyptians, *and from them to the* "Arabians; *Among* these *it was infinitely mingled with* va- "nity *and* superstitious devices: *but it doth not appear* at "all *in use with* Aristotle *and his* Sectators: *Nor doth it* "*appear that the* Grecians, *or the* disputing Ages, *were con-* "*versant in these useful and* luciferous Processes.——

Our *Virtuoso* is not willing to dispute whether *Hermes* were the Author of Chymistry, or not: It had become one that is encharged with the Cure of Souls very well, to have declined all these other *disputes*, as being remote from those *Studies*, by which he *ought* to qualifie himself for a befitting discharge of the *Ministry*. But to tell him further, what I am sure he is ignorant of, the *Egyptians* did never attribute to *Hermes* the Invention of *Physick*, or any part of it, but to *Apis* and *Æsculapius*; and as for that *Chymistry* which they practised, which consisted in melting down and improving of *Metalls*, or making of *Gold*: the *Egyptians* did never reckon the discovery of that *Art* amongst the praises of their *Hermes*, though they were very forward to magnifie *him*, and to ascribe unto *him* a great many *Elogies*. Nay, when they do recount the *Authors* of their *Chymistry*, though they do not agree about *them*, yet there is none that transfers that *honour* upon this *Trismegistus*. But whether *Æsculapius*, or the wicked *Angels*, (to both which the *Invention* is attributed) were the discoverers of *Chymistry*, I think I may allow the *Egyptians* to have been the first *Practisers* of it, and that there wanted not those

Chemiæ nomine olim haud legas quid aliud significatum, quam χρυσοποιητικὴν *aut vero* μεταλλεργικὴν. *Nam quæ viliorum metallorum lapidumque in melius commutationem pollicetur Ne quidem legere est vel medicamentis præparandis operam aliquam impendisse priscos* Chemiæ *professores.* Conring. *de Med. Herm. c. 3. p. 15.*

thoſe who did mention *Hermes* amongſt them that uſed *that Art*, and were eſteemed *Philoſophers*. *N*or is the *Egyptian Chymiſtry* of any great Antiquity, there being no mention of it in any *Greek* or *Latine* Writer, till almoſt the fourth *Century* after *Chriſt*. *N*either is the name only of *Chemia* or *Chemiſtry* of ſo modern a date: but there is not any record of any *book* written, or *work* performed, that *imports* any ſuch thing. Yet have the *Alchymiſts* (it is true) pretended to a greater *Antiquity*, entitling ſeveral *ſpurious* books to *Hermes*, *Moſes*, (and *Miriam* his Siſter) *Democritus*, *Plato*, *Ariſtotle*; and made as if *their Art* were intimated in the fable of the *Golden Fleece*, the *Heſperian Orchards*, and the *Song of Solomon*. In which I cannot but take notice of the different procedure of thoſe *Chymiſts*, and our *Experimental Philoſophers*: the *one* attributed all *glorious diſcoveries* to the *Ancients*, their *Predeceſſors*; *theſe* will not allow *them* thoſe praiſes which *indiſputably* belong unto *them*. But however, that I may grant our *Virtuoſo*, that *Chymiſtry* did flouriſh in *Egypt* in *ſuch manner* and at *ſuch time*, as I have declared out of *Conringius*, (to whom I refer the inquiſitive Reader) yet I muſt not gratifie him with this other conceſſion, that *from them it came to the Arabians*, the followers of *Ariſtotle* not being at all acquainted with it, nor the *Grecians*, or *thoſe diſputing Ages*, being at all converſant with *it*. For it is made evident by *Conringius*, (*c.* 26. *p.* 368.) that it paſſed from the *Egyptians* to the *Greeks*. There are of *Greek* Writers, *Zoſimus Panopolita*, *Olympiodorus*, *Stephanus*, *Syneſius*, *Michael Pſellus*, *Blemmydas*, and many others, which are inſtanced in by the ſame *Author*, and deduced through the ſeveral *Centuries* anteceeding the *Saracen* Empire. The very name of χημεία or χυμεία,

Vide *Conring.* c. 3 p. 28.

In the time of Conſtantine A. D. 320. Firmicus *is ſaid to be the firſt that is recorded to have named* Alchimia; *he ſaith, that* Saturn *diſpoſeth to* Alchimy. *Whence* Libavius *argues that it was then an* Art, *and had been long practiſed, or elſe how comes it under* Aſtrological Prediction? *But there is no conſequence in that reaſon of his it being uſual for Aſtrologers to accommodate the Stars ſo as to have an influence upon* novel inventions. *Under* Theodoſius *the* Great, A. D. 38. Heliodorus *writ a book to the Emperour about the* Chrysopœia; *and ſomething about that Art to* Cyrillus, *as* Cedrenus *witneſſeth.* Libav. *in Exam cenſur.* Pariſienſ.

Several of theſe Greek Writers were ſeen by Salmaſius *in the* King *of* France *his Library and by* Reyneſius, (*vide var. lect. l.* 2. *c.* 5 *p.* 155.) *who tranſcribes this paſſage as the Concluſion of one of them.* Γίνωσκε ὦ φίλε, καὶ τὰ ἐν τῷ βιβλίῳ τῶν πάντων ἀρχὴ Πλάτων Ἀριστοτέλης, Ἰωάννης ἱερεὺς Δημοκρίτου, Ζώ-

is

σμος ὁ μεγαςόλυμπόλως & Στέφανος ὁ φιλόσοφος, Σοφὰρ ὁ ἐν Περσίδι, Συνέσιος, ὁσάνης ἀπ' Αιγύπτυ, lest any one should think that by ποιηταὶ were meant our Wits, and Poets, and Inventors. I must adde, that it is a name long ago fixed upon the Chymists, and Chrysipporeticks, as Reynesius de clares.

is *Greek*, as *Vossius* observes, *de Philos.* c.9. The *Mooriſh* particle *Al* being prefixed. Nor is the word *Alembex* of any other original, being compounded of the ſaid Αλ & ἀμβὶξ, a term uſed by *Dioſcorides* to ſignifie a veſſel, not much unlike our *Limbecks*. Dioſc.l.5.c.64. vid. *Conring.* & *Voſſ.* ubi ſupra. From the *Greeks* together with other Learning, even *Chymiſtry* was tranſmitted: and *Geber* himſelf (as *Leo Afer* relates it, *lib.3.pag.136.*) was but an Apoſtate *Grecian.* This *Geber* is the moſt ancient of *Arabian Alchymiſts*, their *Idol*, and ſtyled *Magiſter Magiſtrorum.* I am not ignorant that *Conradus Geſnerus* (in præf. ad *Evon.*) and ſome others have reckoned upon *Geber* as if he had been originally a *Saracen*, and the *Nephew* of one *Mahomet*: ſome ſay he was the Grandchild of the Impoſtor *Mahomet*: but their credit is not equal to that of *Leo Afer*, who appears a moſt learned perſon, and inquiſitive even to *Curioſity* into the *Lives* as well as *Cuſtoms* of the *Moors*, his Countreymen.

Geberus *quem volunt circa annum Portus virginei ſexcentiſſimum in vivis fuiſſe* Libav *exam.cenſur.Pariſienſ.*

Leo Afer *Hiſt. Africæ* l.3.

Habent Feſſani Arabes multa Chemicæ artis opuſcula a viris doctis conſcripta, inter quos potiorem locum habet Geber, qui centum annis poſt Mahometen vixit, quem natione Gidum aiunt fidem abjuraſſe.——*Geſner* cannot tell at what time he lived, but he ſaith he was not the *Inventor*, but *Illuſtrator* of the Art of *Diſtillation.*——*Quanquam non illum primum hujus Artis Inventorem, ſed Illuſtratorem fuiſſe exiſtimo. Hoc in opere quod ſummæ perfectionis inſcribitur, de diſtillatione in Genere Multa pulchre diſſerens, varios diſtillandi modos fere omnibus notos eſſe ſcribit: nimirum ut vetus quoddam ſuo ſeculo, non recens quoddam inventum.*

Conrad Geſn. *in præf. ad Evonym.*

But though the *Greeks* were not free of the *Metallurgical* part of *Chymiſtry*, yet did they not prepare any *Medicines Chymically* (that I know of,) except it were the *Alcaliſate Salts*, and *Ecchylomata*, or *Juices* formed into *Extracts*, and *Oyls drawn per deſcenſum.* This ſeems manifeſt in that *Oribaſius*, *Aetius*, *Paulus Ægineta*, *Alexander Trachcanius*, PAULUS & JOANNES *Iatroſophiſta*

phiſtæ of *Alexandria*, *Simeon Sethus*, *Actuarius*, *Nonus*, and others mention no ſuch Medicaments: no, nor *Michael Pſellus*, though he writ a peculiar Tract about *Chemiſtry*. Neither hath *Nicolaus Myrepſus* (though a modern *Grecian*) any *Chymical* Preparation. Conringius c. 26. p. 370. Geſner. *in præfat. ad* Euonym.

The *Arabians* ſeem the firſt that ever accommodated *Chymiſtry* in an eminent manner to *Phyſick*; if it be true, as *Libavius* imagines; that *Abulchaſis* did live in the time of *Muhauia* the *Saracen*, that ſetled their Empire at *Damaſcus Anno Dom.* 660. Chymiſtry then ſeems to have been regulated into an *Art*; He writ a Book of *Phyſick* called *Servitor*, which principally treats of *Medicines Chymically prepared*, and uſeth the terms of *reverberation*, *calcination*, *coagulation*, *diſtillation per aſcenſum* & *deſcenſum*: and many *ſuch like expreſſions*, together with *Proceſſes* purely *Chymical*. It was *then* that *Alchymie* was called *Perfectum Magiſterium*; and that which we call *Oyle of Bricks*, did bear the name of *Oleum Sapientiæ & Perfecti Magiſterii*. Libav *in exam. ſent.* Paris.

So *Avicenna* ſpeaks not only of *Roſe-water* diſtilled: but of *Mercury* and *Arſenick* ſublimed: after him *Joannes Meſues* ſhews how to make ſeveral *Chymical Oyls*, as of *Amber*, *Wheat*, *Oleum Philoſophorum*, *&c.* Neither is it to be doubted, but that there were an infinite number of *Chymical Proceſſes* latent in the hands of particular *Artiſts*, ſince *Joannes Meſues* refers us unto them, viz. *de quibus loquuntur, qui quæ ſunt occulta in rebus manifeſtant & detegunt. Hos quoque aggredere rei hujus cupidus tam famoſæ apud illos.* After that the *Weſtern Chriſtians* were civilized and inſtructed in the *Sciences* by the *Moors* inhabiting *Spain*, and that *Phyſick* ſuperſtructed upon the principles of *Galen*, *Avicenna*, and *Averroes*, was derived unto them, thoſe *Sectators of the ancient Philoſophy* improved *Chymical Pharmacy* very much. Conring. *ubi ſupra*, p. 374. *Vid.* Conring. *ubi ſupra*. Reade *Libavius* more fully upon this ſubject in *Exam. cenſur. Pariſienſ.*

Nor

nor were *Albertus Magnus*, *Aponensis*, *Gentilis de Fulgineo*, *Arnoldus de villa nova*, *Raymundus Lullius*, or *Joannes de Rupescissa*, or *Isaacus Hollandus*, or *Basilius Valentinus*, or *Antonius Guainerius*, or *Michael Savonorola*, or *Montagnana*, or *Hieronymus Schallerus*, and *Magenbuchius* (Chymical Physicians at *Norimbergh* before *Paracelsus*) or *Guilielmus Varigana*, or *Antonius Fumanellus*, or *Wolfgangus Talhenserus*, or *Hieronymus Brunsvigus*; (the first that writ of *Chymistry* in the *German* tongue) any *other* then *Pretenders to the ancient Physick* and *Philosophy*. There was no *faction* betwixt the *Physicians* in those days; nor did *they* undervalue or decry each *other*; They rather represented *themselves* to be Adherents and *Sectators* of *Aristotle*, then his *Enemies*; and chose rather to *sophisticate* his fourth book of *Meteors*, to shew that *great Man knew all things*, then condemn all his other works, as if *he knew nothing*. Nor were *they* only followers of the *PERIPATETICKS*, but I finde the *Chymists* that did precede *Paracelsus* to be accounted *Hippocratical Physicians*: witness this passage in *Gaspar Bravo*, who inquired more into them then I have had leisure to doe.

Conring. ubi supra, c. 27. p. 379. 380, &c.

Conring. ibid. c. 28. p. 387. *Erastus* de metall. p 34.

Gaspar Bravo Resolut. Medic. part. 1. disp. 1. sect. 1. resol. 3. sect. 2.

Resolvendum, artem Spagiricam veterum Spagiricorum, quam Avicenna, Geberus, Rhasis, Arnoldus de villa nova, Raymundus Lullius, Blemmydas, *Braceseus, Virceanus, Joannes Augustinus, Panterus, Isaachus Monachus, Morienus, Zosymus, & alii Hippocratis Sectatores professi sunt diversam esse a Secta Paracelsistica.* With this agrees that passage of *Conringius* de Med. Herm. c. 28. *Certe ante Paracelsum haud est observare in Chemicorum scriptis singularem aliquam sive Hermeticam, sive Chemicam Medicinam. Observata autem est plerumque medendi illa via quam Hippocrates, Galenus, horumque Sectatores cum Graeci tum Arabes, interq; eos Avicenna calcaverant: quod unum Arnoldum Villanovanum legenti non potest non Sole videri clarius.* So *Primrose* de vulg. Error. l. 4. c. 1.

With him agrees *Libavius*, in the forecited Tractate.

c. 1. *Hæc medicamenta præparandi ratio non a Paracelſo inventa eſt: ſed multis ante Paracelſum natum ſeculis exculta fuit ab iis etiam Medicis qui Galeni doctrinam ſectabantur, ut Raym. Lullio, Villanovano, &c.*

But when *Paracelſus* was ſeiſed with the ſame *ſpirit* that ſeems to ſway ſome of the *Virtuoſi*: then did *he* begin to decry the ſtudy of *Languages*, as loſs of time; our *Wits* call it *Pedantry*. *He* vilified *Logick* as that which cauſed *endleſs diſputes*, and darkned rather then diſcovered *Nature*: He calls it *matrem odii, rixarum & litium*; He prohibited the reading of other *good* and *Ancient Authors*. He ſeemed to be of *no Religion*; and if for any, it was to be without *Metaphyſicks*, without the mixture of *Gloſſes* and *Interpretations*, *Solum textum Scripturæ legendum, interpretationem nullam adhibendam*. He calls upon all *Univerſities* and *Countreys* to reſort unto *him*, to follow *him* and his *new diſcoveries*. his *real Philoſophy*, his *Eſſential Anatomies*, all other performances being but *empty* and *verboſe*.

Becauſe I obſerve ſom reſemblance betwixt the invitations of Mr. *Sprat* and his, I will ſet one of his paſſages down in the Preface of his *Paragranum*, viz. *Me ſequimini; Non ego vos ſequar. Me, me, inquam, ſequimini, Avicenna, Galen, Rhaſes, Montagnana, Meſue. Me ſequimini; non ego vos ſequar, Pariſienſes, Monpelienſes, Suevi, Miſnici, Golonienſes, Viennenſes, qui Danubium & Rhenum accolitis. Vos item Inſulæ marinæ, Italia, Dalmatia, Athenæ, Græci, Arabes, Iſraelitæ, me ſequimini, non ego vos ſequar. Mea enim Monarchia.* Hereby any one may ſee that He was as *conceited* of himſelf, and as great a *contemner of all ancient Learning*, and of *Ariſtotle*, and *Galen*, *&c.* as ſome of the *Virtuoſi*: and as *ignorant of Latin* and other *tongues*; and as *falſe* and *imperfect* in his *relations*; as *variable* in his *hypotheſes*, as if he held nothing but with the power of *revoking* it, which is a great qualification of a *modern Philoſopher*. He was not for the *particular methods* in vogue, but for a *general Enquiry* into the *Experiments* of *old Women, Mountebanks, Hangmen, Husbandmen, &c.* He could make uſe of the *writings* and *inventions* of others, concealing *their names*, and boaſting them for new and *his own*, as

Sed in primo *de peſtilitate* tractatu primo, ubi da *Chelidoniæ* contra imaginationes Magicas amuleto differit, adeo non rejicit *Galeni & Hippocratis* decreta, ut etiam amplius vider velit *Galeni*- i *cus*, quàm omnium ſcholarum profeſſores publici. *Libavius* ubi ſupra.

as becomes a modish Experimentator. To evince this last assertion, I shall set down some passages of *Crato*, and others, to shew that the *disputing Ages* were not so ignorant of *Chymistry* as Mr. *Glanvill* pretends. *Crato* in a Letter to *Erastus* writes thus; *Remedia quibus aliquando usus esse dicitur, non illius esse ex eo certus sum, quod librum vidi ante ducentos fere annos a Monacho quodam Ulmæ scriptum, in quo eadem medicamenta, quæ ille frustillatim, nunc in has nunc in illas chartas sparsit, perspicue sunt scripta.*——And elsewhere, *Fuit in bibliotheca viri optimi & integerrimi Marci Singmoseri Sacratissimi Impp. Consilii a Secretis primi, liber ante ducentos annos a Monacho quodam exaratus. Eo multis mensibus usus sum, & omnia quæ isti (Paracelsici) tanquam in Eleusiniis sacris mussitant, tam evidenter tradita, ut neminem fallere possent animadverti.* He himself confesseth who were his teachers in *Chimistry*, and that *he* was far from being the first *Inventour* of it. "*Theophrastus Paracelsus* natus "anno Christi 1493. mortuus 1541. Hic non erubuit con- "fiteri se remedia in Chymicis accepisse, & his ipsis Scien- "tiam Artis Chymiæ debere. *Antiqui Philosophi* (ait in 2. "*parte Chirurgiæ mag. tractat.* 3. c. 1.) *studiosi indagandarum* "*longæ vitæ causarum* (recitamus breviter sententiam) *de-* "*stituti vero perfecta præparandorum componendorumque me-* "*dicamentorum scientia ab Alchymistis eam petere non sunt ve-* "*riti, atque sic utronemque laboribus conjunctis genuina præpa-* "*randorum remediorum Scientia exorta,& variis Chemicis ex-* "*perimentis in medicinam transfusis est aucta, maxime vero* "*tincturis & floribus metallicis, quarum tincturarum quanta* "*fuerit efficacia, antiqui ea de re Codices testantur, quos diu a* "*Pseudomedicorum turba suppressos, nos publicos facere non du-* "*bitavimus. Remedia nostra ex Chymicorum Schola prodiisse* "*non dubito fateri: & quoniam Chymica ars infinitis erroribus* "*scatere visa est, illud quoque Augiæ stabulum repurgandi* "*laborem sumpsimus: in quo felicius mihi versari licuit, quod ob* "*ineunte ætate magnæ Artis studio captus summa diligentia sub* "*excellentissimis præceptoribus Arti huic studuerim. Præce-* "*ptores enim fuerunt Wilhelmus Hohenheimius Pater, & alii* "*infiniti: præter hos quoque scriptis adjutus sum Setthagii Episcopi,*

Erastus part. 4. p. 300.

Præf ad Exercit. Scaliger. Hartman & Crollius *published no* new *medicines.* Cæterum neq; *Crollium* neq *me* a iquid novi protulisse libenter fatemur, neq; ea unquam utriusq; nostrum mens fuit. *Hartman.* in not. ad *Croll.* p. 138. *Libavius* ubi supra.

" *piſcopi, Erhardi Laventalii, Nicolai Hipponenſis Epiſcopi,*
" *Matthæi Schechtii Suffraganei Treiſingenſis, Abbatis Span-*
" *heimii, aliorumque doctiſſimorum Chemiſtarum: Quin & va-*
" *riis eorum experimentis factus ſum locupletior, inter quos ho-*
" *noris cauſa nominandus mihi venit nobiliſſimus vir Sigiſmun-*
" *dus Fueger Schwathenſis, qui magnis ſumptibus pluribus mi-*
" *niſtris ſuſtentatis Chemicam acceſſione locupletavit.* Hæc ibi
" *Paracelſus.* Neqne vero falſa ſcribere eſt putandus,
" quandoquidem ſeculum iſtum & exercitiis Chymicis &
" voluminibus ſcatuit, cum jam plures tractatus typis
" publicis ſint impreſſi, nihilominus cernimus, ſubinde ex
" tenebris prodire plures, ita ut ne *Theſauri* quidem multi
" videantur ſufficere cupiendis, nec *Theatra.*

His followers confeſs, that he borrowed much out of *Baſilius Valentinus,* and more out of *Iſaacus Hollandus,* as *Penottus* declares, *Cum incidiſſem in Iſaaci librum de opere vegetabili, reperi de verbo ad verbum doctrinam de tribus principiis, & de ſeparatione quatuor Elementorum ab eo deſumptam. Unde conſtat* illum *præcipua ſua Opera ſuffuratum fuiſſe, atque hinc inde expiſcatum: ut de gradationibus medicinarum ab Arnoldo, Archidoxa a Raymundo Lullio ex ſua Arte operativa: de Arcanis a Rupeſciſſa; nihil prorſus a ſeipſo præter convitia & maledicta: a Trithemio varia.*---The ſame is confeſſed by *Quercetan* ſomwhere as I remember, and *he* himſelf *intimates* it by adding to many *preparations* the words, *Ex noſtra correctione, ex mea emendatione.* Out of all which it is evident, that neither the *Grecians,* nor the *diſputing Ages* were ſo ignorant of *Chymiſtry,* as Mr. *Glanvill* aſſerts; as it is certain that the *Arabians* as well as the *Grecians* were *diſputers* and followers of *Ariſtotle* and *Galen,* and that particularly *Albertus Magnus* and *Roger Bacon* were *Schoolmen.* Nor can any man doubt the ſame of thoſe other *Biſhops* and *Monks,* who knows with what *perfect* Veneration, in thoſe days *Ariſtotle* was regarded. How *uſeful* and how *luciferous* their Proceſſes were, it is not for Mr. *Glanvill* to judge, who is ignorant of *them*: but any one will allow them, both the *one* and the *other, recommmendation,* who conſiders that their *Chymical* Proceſſes which paſſed amongſt *them* gave occa-

De deriv. medic.

Vide *Conring.* de med. Herm. c. 24. p. 252, 253.

 ſion

sion to *all, and make a great part of the improvements in Chymistry,* in *Dioptricks* and other *Subjects,* wherein our *Virtuosi* pride *themselves.* Particularly as to *Chymistry,* it is as clear that the *disputing Ages* and followers of *Aristotle* were acquainted with *it,* and eminent for *it,* as that there were *Monks* and *Schoolmen.* Those men whom Mr. *Glanvill* so explodes, and with whom the *Historian* disports *himself,* had of late years before *Paracelsus,* in a manner, *solely* the knowledge of *this Art by which Nature is unwound,* &c. This *Sennertus* granteth. *Proximis seculis fere inter Monachos latuit Chymia, quorum non pauci illud, quo abundabant, otium post sacras meditationes & orationes, arti huic præstantissimæ honeste tribuerunt: inter quos fuerunt Raymundus Lullius, Albertus Magnus, Joannes de Rupescissa, Savanarola, Morienus, Rogerius, Trithemius, & Frater Basilius Valentinus: quorum scripta multa hoc seculo in lucem edita sunt, & multa adhuc manuscripta passim latent.* I hope there is no exception against *Sennertus,* how partial soever *Erastus* or *Crato* may seem. And to affront our *Virtuoso* a little more, it was a follower of *Aristotle,* and those *Disputers,* a pitiful *School-Divine* that discovered the making of *Gun-Powder,* which single invention out-does all that our *Collegiates* boast of. In the year 1354. *Bertholdus Schwarz* a *Benedictine Monk* discovered it, and I dare warrant him in *those days* no enemy *to the man of Stagyra, the Idol of disputers*; A very ancient *Manuscript* gives him this Character. *Bertholdus Schwarz Goslariensis Monachus ordinis Sancti Benedicti, cum mire Chymicis delectaretur, atque eorum peritia jam magnam sibi nominis existimationem acquisisset,* &c. Any one may read the rest in *Kirchers Mundus subterraneus l.* 12. *sect.* 5. *part.* 4.

De Conf. Chym. c. 3.

I shall relate some particular processes in *Chymistry,* which are mentioned by such as were not *Arabians,* but of a much more *ancient* date. In the time of *Julianus* and *Valentinianus* Emperours lived *Aetius Amidenus*; he and *Nicolaus Myrepsus* (who is indeed later then *Mesue*) do mention the distillation of Oyls *per descensum,* as *Gesner* shews; and *Vossius* together with *Conringius* avow ——

Vossius de philosoph c. 12. sect 12. *Gesn.* in præf. ad Euonym. *Vossius* de philos c 13. *Conring.* de med. Herm c. 26. p. 371.

Nicolaus

Nicolaus Myrepſus (or *Præpoſitus*)--*in quo illud miror nullam ab eo aquarum oleorumve Chymiſticis inſtrumentis paratorum mentionem fieri. Gapniſtum tantum oleum, quod per deſcenſum diſtilletur, deſcribit, ut Aetius quoque.* As to the ways of making *Chymical Extracts*, let any man judge whether the *Grecians* were ignorant of them, by theſe paſſages, as they are cited by *Gunterus Billichius*, viz. *Chyliſmata extrahuntur aut exprimuntur. Extrahendi nec ars nova eſt, nec novus modus, quanquam Heurnio ita viſum ſit Method.* ad *praxin. lib.* 1. & *lib.* 2. *c.* 25. *Rationem ejus a Dioſcoride accipe, verbis interpretis Ruellii* lib. 3. c. de *Gentiana. Contuſa, inquit, radix quinque diebus aqua maceratur, poſtea in eadem tantiſper decoquitur, dum extent radices, & ubi refrixit aqua, linteo excolatur: mox diſcoquitur, dum mellis craſſitudo, fiat fictilique reconditur. Similia* cap. 9. *ejuſdem libri* de *Centaurio minore habet. Dabo tibi ipſiſſima Dioſcoridis verba*; Χυλίζεται ὃ ἡ πύα συλλεσμὴν ἐχώμων ἕσα σπέρματος, καὶ ἀποβρεχομὴν ἡμέρας ε. εἶτα ἕψεται ἄχρις ἂν ὑπερέχοι τὸ ὕδωρ· ἕωσπα τοῦτο ψυχθέντος, ὑλίζεται δι' ὀθονίου πλαβείσης τὴν πύας, καὶ πάλιν ἕψεται μέχρι μελιτώδους συστάσεως. *Nequid ad plenitudinem artificii deeſſet, ſubjungit*; *Quod ſiquid concretum faucibus vaſis adhæreſcat, deradunt, reliquoque humori permiſcent. Item hæc*; *Quæ autem ſiccis radicibus aut herbis liquamenta exprimuntur, decocta* (*ut in Gentianæ mentione retulimus*) *præparantur. Ita Lycium & Abſcynthium, hypociſtis, & conſimilia coguntur.* De *Lycio vide* cap. 135. lib. 1. *de hypociſtide libri ejuſdem cap.* 128. *Chyliſmatis denique abſynthini, cap.* 26. *meminit. Nec aliter Extractum Melampodii clariſſimus Raymundus Mindeſerus concinnavit, quod in Pharmacopœia Auguſtana inter Ecchyliſmata Cathortica locum non poſtremum reperit. Ut liqueat, extrahendi artificium, dignum omnino fuiſſe, quod & erudita antiquitas inveniret, & non degener poſteritas imitaretur. Nec quicquam Chymia novi, præter liquorem attulit.*

Obſervat & paradox. chym. l. 1 c. 2. p. 2.

Dioſcorides lived in the days of Cleopatra and Marc. Anton. whoſe Phyſician he was, and ſo lower of Herophilus, and conſequently of Hippocrates and Ariſtotle. Vide *Voſſ* de philoſ. c. 11. teſt. 40. & *Jonſium* de ſcript. hiſt. & phil. l. 2. c. 6. p. 145.

Concerning *fixed* and *Alcaliſate Salts*, the *Chymiſts* and *Chymical* Phyſicians make a great noiſe: and undoubtedly the *Invention* is very *extraordinary*, and their uſe very *ſingular* in Medicine. Yet both the preparation and the uſe of *them* is ſet down by *Dioſcorides*, *Galen*, and *Aetius*, in their diſcourſes about *Theriacal Salts*; Though latter days have reformed the preparation, as *Galen* endeavoured to do that which he found in uſe in *his time*. Beſides, I obſerve out of *Gunterus Bellichius*, that *Ariſtotle* was not ignorant of it. *Ariſtoteles auctor eſt, Umbros cinerem harundinis & junci decoquere aqua ſolitos, donec exiguum ſupereſſet humoris: qui ubi refrixiſſet, ſalis copiam fecerit*, lib. 2. *meteor.* cap. 3. *Hoc ſe apud* Theophraſtum *invenire* Plinius *teſtatur*, lib. 31. cap. 7. *Idemque non harundinei tantum juncique ſalis meminit, ſed colurni inſuper, & querni. Amborum autoritate (nam de Theophracto nihil mihi conſtat) Chymicorum caſtigabitur temeritas, quæ ſuis inventis ſalem cineritum annumerare auſa eſt.*

See the antiquity of the uſe of Alcaliſate *and other* Salts *by the* Ancients, *largely proved by* M. Rulandus progymn. alchym. qu. 14, 15.

Vide *Galen.* de Theriaca ſub finem, & *Pharmacop. Auguſtan.* in append. ad antidot. claſſ. de Salib. Theriacal.

G. Bellichius obſervat. & paradox. *chym.* l. 1. c. 2. p. 30. & in *Theſſalo chymicum* c. 7. p. 90.

The preparation of *Salt-peter* with Sulphur, in order to the making of what the *Chymical* Phyſicians call *Sal prunellæ*, was known to *Hippocrates*, and others of the *ancients*, and they uſed it in *Squinonſyes* in Gargariſmes for the *tongue* and *throat*. *Deſinant in poſterum Chymici de lapide Prunellæ magnifice gloriari. Nam & apud Hippocratem* τὸ νίτρον ὀπτὸν *quater invenimus. Semel quidem in tertio de morbis: bis in de internis affectionibus: denique ſemel in lib. de morb. mulier. Ac ne dubites erudite antiquitati cognitum eum lapidem fuiſſe,* Plinius auctor eſt, *nitrum frequenter liquatum cum* Sulphure *coqui in carbonibus, ſulphuri concoctum in lapidem verti. Hæc recognoſce* ex *lib.* 31. *cap.* 10. And the ſame *Author* ſaith elſewhere, *Præ aliis omnibus inclaruit* νίτρον ὀπτὸν *Hippocratis* ſeu *lapis* Plinii *nitrarius, dictus a barbarorum pruna ſeu angina, cui ſingulariter mederi perhibetur. Nec nova eſt quæcunque ea laus. Nam & Hippocrates abſtergendæ Salivæ & muco, ac facilitandæ exſcreationi nitrum anginoſis obtulit, indiditque*

G. Bellichius obſerv. chym. l. 1. c. 5. p. 49.

G. Bellichius ib. l. 2. c. 3. p. 119.

ditque collationibus Oris. Lib. 2. de morbis, sect. 49.

Neither is the way of *subliming Flowers of Benzoin*, any thing else then the imitation of that way which the *Ancients* had of condensing *Soot*. So *Bellichius* informs me, *Fuligo, definiente Scaligero, cujusque rei pinguis crematilis pars est, ac demum aliarum rerum fumus condensatus, Exerc. 56. Modus conficiendæ ejus, siquid artificii subest, apud Dioscoriden extat*, lib. 1. c. 85, 86, 94, 97. *imitatio apud Beguinum, quando Benzoinum defloravit*, l. 2. c. 18. *Id ib. l. 1. c. 2. p. 31.*

It may perhaps be granted by most intelligent persons, that the making of Extracts, and *fixed Salts*, and such instances of *Vegetables* being *prepared* as I have given, and the *glory of those inventions* cannot justly be denied unto those *disputing Ages*; but that the *preparation of Minerals*, and the *medicinal use* of them *inwardly*, is a discovery the ancient times were not acquainted with. And this is the judgment of many *learned* men. But in refutation of it, seeing that the inward use of *Antimony*, as it is several ways prepared, refers to *Basilius Valentinus*, and before *his* days; since that, sundry preparations of *Mercury* are more *ancient* then the humour of *Novellism*; since *Paracelsus, Hartman, Crollius* did but publish the processes of *Aristoteleans, Avicennists*, and such like *Monks* and *Physicians*; all that our *Virtuoso* can derive from this *Plea* is, that the *Arabians*, adherents to the old *Philosophy* and their *followers*, did improve the *extent* of *Chymistry*, and added thereunto as they did in the other *practice of Physick*, the use of *Rhubarb, Cassia, Manna, Tamarinds*, and other benign medicines: and this demonstrates *that Philosophy* and *those notions* not to be so *steril*, as they are represented in comparison of the *Fecundity of the Cartesian Principles*, from whence *Physick* hath received *little* (if any) *benefit* or advantage. But to raise this Enquiry beyond the times of the *Saracen* Empire, it is manifest out of *Pliny*, that *mineral*-waters were drunk in those ancient times: and that the *Stomoma* or *rust of iron*, as also that drinks in which *Iron* was quenched, was given in the time of *Dioscorides* and *Galen*. That *Brimstone* was given inwardly by *Hippocrates* to *asthmatick* persons. That the *Squamma aris* *Dios. l. 5. c. 53.* *Galen. l. 1 de cupor. ist. c. 17.*

Hippocr. de vict. in morb. acut.
Vide *Doring.* de medicina, p. 217. *Ruland.* progymn. qu. 20.
Brassavol. de med. purg. p. 177. *Foterius.* Pharmacop. *Spagir.* l. 2. c. 6.

Doring. de medic. & med. p. 219. Vide & *Ruland.* progymn. *Alch* qu. 20.

æris was given inwardly, as a *purge* and *vomit* by *Hippocrates*, *Galen*, *Dioscorides* and *Celsus*: and the Experiment happily tried by *Brassavolus*, that great *Experimentator* again of later years. So the giving of *Sandaracha*, or *Orpiment* inwardly for old coughs; and the *suffiment* made out of it, are recorded by *Dioscorides*: the trochises of it recommended anew by *Mesue*, and the more modern trials in *Riverius*. Even *Chalcitis* is an ingredient in the ancient *Treacle* of *Andromachus*. I shall conclude all with the passage of *Doringius* in the place already cited, *Præter Sandarachum Isidorus, Athenæus, Idius, Eubulus, Heras, Gemellus, Agathius, Nicostratus, Menander, Thanyros, Deletius Epagathus, Asclepiades, & alii: Alumen sciissum, Auripigmentum, Æris squammam, Æs ustum, Calcem vivam, Sulphur vivum, fæces unde ustas, Cadmiam, Cerussam, Gypsum, Stibium sive Antimonium in pastillos redacta dysentericis præscripserunt: quorum præparandi rationem & utendi modum vide apud Galenum lib. 9. de compos. med. sec. loc. c. 5.* Out of which passages any Reader will guess what President *later Authors* had out of the more remote *Ancients* for the giving *minerals* inwardly; and if we are just to the *Arabians* and their followers, we shall scarcely allow them any further honour, then to have found out some *new ways to serve up old dishes*.

I shall adde, that in *Egypt*, at such time as the repute of the *Egyptian Priests*, and their *phantastical Philosophy* had given way to the followers of *Hippocrates*, *Aristotle*, *Herophilus*, and others, that introduced the *Grecian* Learning there, that is, in, and somewhat before the days of *Diocletian*, the *Egyptians* were *Masters* of that Secret of *making Gold*, which our inquisitive *Moderns* have so *vainly* sought after. Before that Age there is no mention of it, and then it is said they had such knowledge of the Art *of making Gold*, that thereby they were enriched and impowered to make War upon the *Romans*; and being overcome by the Emperour *Diocletian*, he burned all the books which they had, containing the Mysteries of *that Art*, to prevent any future commotions of that Nature. So *Suidas* in the word Χημεία, ἡ τοῦ χρυσοῦ καὶ ἀργύρου κατασκευή, ἧς τὰ βιβλία διερευνησάμενος

νησάμην. ὁ Διοκλητιανὸς, ἔκαυσε διὰ τὰ νεωτερισθέντα Αἰγυπτίοις. And in the word Διοκλητιανὸς he says, ὃς δὴ καὶ τὰ περὶ χημείας χρυσοῦ καὶ ἀργύρου τοῖς παλαιοῖς γεγραμμένα βιβλία διερευνησάμενος ἔκαυσε πρὸς τὸ μηκέτι πλοῦτον Αἰγυπτίοις ἐκ τοιαύτης προσγίνεσθαι τέχνης, μηδὲ χρημάτων αὐτοὺς θαρρύνοντας πρεσβεία τῶν λοιπῶν Ῥωμαίοις ἀναίραν. The renown of this *Story* is not questioned by the *Chymists*, and I finde the learned *Joannes Langius* to give credit unto it, quoting for the truth of it in his margin, besides *Suidas*; *Orosius* l.7. c.16. And *Paulus Diaconus* in the life of *Diocletian*: Neither doth *Libavius* or *Rolfincius* elevate the authority thereof, though *he* mention the passage of *Suidas*. And to give a further colour unto this relation, I am informed that *Æneas Gazæus*, who lived in the latter end of the fifth Century, when *Zeno* and *Anastasius* were Emperours, treating of the Resurrection, hath this passage, Παρ' ἡμῖν οἱ περὶ τὴν ὕλην σοφοὶ, ἄργυρον καὶ κατάχρυσον παραλαβόντες, καὶ τὸ εἶδος ἀφανίσαντες ἐπὶ τὸ σεμνότερον μεταλαβόντες τὴν ὕλην, χρυσὸν κάλλιστον ἐποίησαν. But these *Narrations* are rejected by such as deny that other *metalls* may be *transmuted into Gold*: It is replied by *Erastus*, that either those *Egyptian* books contained nothing but the Art of *melting down of metalls*, and separating the *latent Gold* therefrom: or that *Suidas* being a *late writer*, living but 500 years ago, about 800 years or more after *Diocletian*, might have been imposed upon by the *Chymists* of *those* times (in *Greece*, and during the *disputing Ages*! mark that Mr. *Glanvill*) who even then might have *feigned* some such *stories* as *that* (and the Allegorising of the *Golden Fleece*) just as they have within the *last Centuries* counterfeited the Works of *Moses* and *Solomon*, and entitle *them* unto *their Fictions*. There are an infinity of *stories* in *Suidas*, which render his Assertions suspected: and in this he hath not the countenance of any *ancient* Writer to second *him*. It seems strange, that the *Romans* having so long ruled in *Egypt* absolutely, and their *Governours*, they not being to be supposed free from all desires of *gain*, how they should never apprehend the *Artifice*, nor have the least mention of it in *their* Writers

Joan. Langii Ep. med. l.1. ep.) 3. de Orig. Alchym. *But* Oros. *and* Paulus Diaconus *were* credulous *Writers, and of* little reputt. *Libavius* in exam. censur. *Parisiens. Rolfincius* chym. Art. ne. redact l 1. c. 10 & *Conring.* de med. *Herm.* c 3. p. 21.

Erastus de metallis, p. 103.

Conring de med. *Herm.* c 3 p. 23.

(*Greek* or *Latine*) till the end of the *fourth Century*: and that ſo remarkable a paſſage as this is ſhould be omitted by thoſe *ancient Writers*, who relate both the *war* and actings of *Diocletian* after his victory. As for that ſaying of *Ænæas Gazæus*, it is replied that he ſpeaks by *hear-ſay*, rather then *certain knowledge* of the *operation*: that there have not wanted many learned perſons, who have with a great deal of *confidence*, illuſtrated the *Reſurrection* by contemplations of the *Phœnix*, and of the *forms* of Plants reſuſcitated in their ſeveral *Salts*, as if *both* were *realities*: yet is there no ſuch thing as either the *one* or the *other*.

Id. ib p. 22.

De plant. reſuſcit. vide *Bellich.* Theſſal. rediv. c. 7. *Rolfinc.* art. chym. l. 6. c. 3. & l. 7. c. 19.

Out of all which it is *evident* that *Chymiſtry* was a practice *known* and in *uſe* among the *Sectators* of *Ariſtotle*: and that the *Grecian* and *diſputing Ages* were not unacquainted with *thoſe Proceſſes*, though theſe *latter times* have been more *various* and *inquiſitive*, and have reduced that *Art* into better *Method*, and enlarged the Practice of *Phyſick*, with an infinity of *Medicines*: and indeed we muſt confeſs our ſelves very much obliged by the labours of ingenious *Chymiſts*, and that they have afforded multitudes of *Experiments*, ſuch as contribute to the *delight* of all *Philoſophical* heads, and to the *Cure* of *many* that *being ſick*, have either *better opinion* of *Chymical* Medicines then of *others*, or are *pleaſed* with their *ſmall*, and commonly more *pleaſant doſe*.

See this largly diſputed by Libavius in exam. cenſur. Pariſienſ.

But that thoſe parts into which *Chymiſts* reduce things, are *latent* in the compound body, otherwiſe then by the *Ariſtotelean* diſtinction of *formaliter* and *materialiter* (ſo much laughed at by Mr. *Glanvill*, pag. 119.) This is an *Aſſertion* which doth not become any man that pretends to have read Mr. *Boyle* in his *Sceptical* Chymiſt, where that Point is too amply debated to be here tranſcribed, or ever (I think) *refuted*. Having denied Mr. *Glanvill*, that *by thoſe uſeful and luciferous proceſſes, Nature is unwound and reſolved into the minute Rudiments of its compoſition*. Which *Rudiments* were not made uſe of at the firſt *Creation*, when one *Fiat* created thoſe *compound bodies*, which *Artful Fires* ſometimes (and but ſometimes) *analyſe* into *ſeveral parts*, as *Salts*, *Oyle*, or *Sulphur* and *Spirit*, and thoſe groſſer *Elements* of *Earth*

Vide *Kerger.* de fermentat. ſect. 1. c. 3. p. 10. & *Rolfinc.* chym. in ar. red. l. 1. c. 19. *Conring.* de med. *Hermet.* c. 22.

and

and *water*. All which are *not found* in *many* bodies, (and when they are, it is with a *great diſcrepancy* betwixt thoſe of one Concrete, and thoſe of *another*) nor any of them to be ſeparated from *Gold*. " Which *Libavius*, no, nor Dr. *Willis* doth not make to be the *laſt unmixt*, and *ſimple Conſtituents of natural bodies*, *ſed ejuſmodi tantum ſubſtantias, in quas veluti partes ultimo ſenſibiles res Phyſicæ reſolvuntur*: Subſtances into which natural bodies are reſolved finally as far as *ſenſe* can judge, and when the *Analyſis* is proſecuted in *one ſort* of procedure: for *another method*, different *Solvents*, and different *Fires* diſcover *different* parts, and thoſe *ſenſible* too from what the uſual *Chymiſtry* builds upon. Having denied him this, I muſt further tell him, that when the *Countreywoman* ſets her *Eggs* to be *hatched*, ſhe produceth by *thoſe means* ſuch *bodies* as no *Chymical* fires with their *vexatious Analyſis* ever would diſcover: ſo ſhe doth when ſhe doth *brew* and *churms* her *butter*. Nor is this more evident, then it is clear that the *Chymical principles*, when they come to be accommodated to the ſolving of the *Phænomena* in *nature*, or in *diſeaſes*, have as much of *darkneſs* and *diſſatisfaction* in *them*, as occurs in the *Peripatetick* way: ſo that now we are more *dubious*, not more *knowing*, then *before*: and this any man that hath conſidered how the *Chymical* Phyſicians diſagree about the cauſes of *diſeaſes*, and even about the common *Phænomena* of *Nature*, will eaſily grant me: nor will it appear leſs manifeſt, that if the *Chymical hypotheſes* do take place, that it will ſubject the *Mechanick Philoſophy*, and eſtabliſh that of *Anaximander*, revived by the ingenious *Berigardus*.

De ferment. c 1. p. 4.

But Mr. *Glanvill* adds, "*That* Chymiſtry *directs Medi-* "*cines leſs* lothſom, *and far more* vigorous, *and freeth the ſpi-* "*rits and purer parts from the* clogging *and* noxious *appen-* "*dices of* groſſer *matter*, which not only *hinder* and *diſable* "the *operation, but leave hurtful* dregs *in the body behind* "*them*.— This Plea for the preferring *CHYMICAL* Medicines before thoſe commonly called *Galenical*, is much inſiſted on by *Beguinus*, *Quercetanus*, and others of *that* way. *Yet*, firſt it is obſervable, that whether we regard *taſte* or

Plus ultra, p. 11.

ſmell, thoſe very *Authors* recommend as *odious medicaments*, and as *loathſom*, as ever *Cœrdus* or *Foeſius* in their *Diſpenſatories*, if not *worſe*. Will any man *in his Wits* condemn *Wormwood* and *Centory* becauſe of their *bitter taſte*, or *Caſtoreum* for the *ſmell*? Secondly, every thing is not the *better* for being *extracted*. Thus the *Extract* of *Rhubarb*, though quickned with its *Salt*, is not ſo *efficacious* as plain *Rhubarb*, except it be ſophiſticated with *Diagridium*. Nor is *Cynnamom* improved by *Extraction*. Their being more *vigorous* and freed from groſſer parts is not *always* a commendation, and *ſometimes* it carries danger with it. That thoſe *groſſer* parts, and thoſe natural vehicles are requiſite, ſeems even thence clear, that their ſpirits & eſſences muſt be tempered and mixed often with other *groſs bodies* before they be given. Thoſe *appendices of groſſer matter* are not always *noxious* to *Nature*, ſince in our *meats* we finde none to be able to *live* on *Chymical viands*, but good *Kitchin-Preparations*. How many ways are there of preparing *Harts-horn*, yet is there *not one* that equalls the *crude Horn*. I ſhall ſet down *Zwelfers* words, whoſe credit no *Chymiſt* almoſt will extenuate. *Licet ex cornibus vel oſſibus ita Philoſophice calcinatis diſtillationi ſubjectis de ſpiritu ſale volatili, & oleo ipſorum fœtido nonnihil eliciatur, non tamen propterea exiſtimandum ipſa adhuc iiſdem quibus crudum cornu pollere viribus vel majoribus etiam (prout nonnulli ſibi imaginantur & aſſerunt) vel etiam, ut alii arbitrantur, hac calcinatione nihil aliud peractum fuiſſe quam quod friabilia, ad pulverandum aptiora, & magis pura reddita ſunt: Neutiquam, Quippe, qui ambo cornua, tam crudum quam Philoſophice calcinatum, examini ignis ſubjiciet, reipſa deprehendet multum de nativa ſua humiditate, de ſale volatili & oleo huic cornu Philoſophice calcinato detractum eſſe, & eorundem vix parte quarta adhuc gaudere, ut propterea & hanc calcinationem Philoſophicam, licet totali exuſtione aliquanto meliorem, approbare nequeam: e contra vero ipſum crudum cervi cornu ſubtiliter & minutim raſpatum pluris aſtimem, quod tamen diverſimode parari,*

Freitag. noct. med. c. 75. p. 325.

See Mr. Boyle of the uſefulneſs of Philoſ. part 2 p. 148, &c.

See this point fully debated in the Vulgar Errors of Primroſe, *l. 4. c 2. which I deſire Mr.* Glanvill *to read.*

In Pharmacop, Auguſt. De CC philoſophice calcinat. p. 805.

In proſecution of this point let any man conſider, that Chymical oyle of Anniſeeds *is not ſo effectual as the powder.* Heurn. meth. adv. l. 1. c. 5. *Nor doth the like oyle of* Camomile *equal the* infuſion, *as* Simon Pauls Cl. quadrip. p. 255. practically *obſerved. So the common* Pillute de ſuccino *and* Franckfort-pills *tranſcend the minute doſes of divers and the moſt famed* Pan-

parari, inque virtutibus ſuis exaltari poteſt. Ut vel in ſubſtantia, forma nimirum pulveris, vel in aqua decoctum & in mucilaginem vel gelatinam converſam tuto & ſine nauſea propinari poſſit. Nor is this more true in *Harts-horn* than in *Vipers*, which are more effectual being eaten as *Eeles*, or by a *common infuſion* in wine, or given in *powder* (*plain powder*) thon when reduced to *volatile Salt* and *Eſſences*. It is alſo falſe, that *Chymical* preparation always *amends*, or doth not render *ſome* things *worſe*: The ingredients of *ſublimated Mercury* are not *poiſon*; the *reſult* is. How much is the nature of *Antimony* and *Mercury* altered by preparing, ſo that a *few grains* prove *mortal* to the taker, who might without *prejudice* devour *great quantities* of either of *them* unprepared, *Hydrargyrus, Antimonium crudum larga ſæpius porriguntur*: The infuſion of *crude Antimony*, (a pound in four Gallons of *Ale*) often rectifies all *impurities of the blood*, as well any *viper-wine*: and *Mercury*, which being crude is not only given in Pills by ſundry *Phyſicians*, but drunk without any hurt in greater or leſſer quantities in ſeveral caſes. *Non deſunt qui Mercurium crudum in dolioli fundo detinent, ferunt vinum ne areſcat, aut vaporem contrahat, aut pendulum fiat, ea ratione fieri. Nos tale vinum ad ventris lumbricos plurimum valere certo ſcimus.* As for the hurtful dregs which the Galenical Medicaments are ſaid to leave behind: I am confident, that whoſoever ſhall enquire into the ill conſequences of the two *Pharmaceutics*, will ſay, that if the *Galenical* be not always the moſt *efficacious*, it is *always* the moſt *ſafe* and *innocent*: and any man will be more apt to *dread* the *violent impreſſions* which the *powerful ſpirits* and *minerals* may make upon the *membranes* of the *Stomach* (which may introduce an *irrelievable* diſtemper in the *torenus* of *that part*, whereupon depends the *nutriment*, *health*, and *vigour* of the whole body) then any noxious *faces* or *little* and *remediable* hurt from the generality of the *Galenical* Medicaments. *Qui Deum credit malefactorum vindicem ultoremque, is a noxiis medicamentis, cum ad manum ſunt alia, diligenter abſtinebit: ne quando homicidii,*

chymagoga. *This is an obſervation ſo common with all practitioners, that none but* Mountebanks *and* Quacks *can deny it.* Crato, Steeghius, Hofman, *and others, generally taking notice of it.*

M. *Ruland.* progymn. *Alchym.qu.* 33.

Poterius Pharmacop. Spagir. l. 1. p. 352. *This experiment is not down in the two Treatiſes of the* Virtuoſi *about the* ſophiſtication of wines: *but in ſhort, thoſe pieces* (*as much as they are famed before they came out*) *have been laughed at by all knowing perſons and* Wine-coopers.

accu-

accusante conscientia, reus fiat, parum profuerit novendecim curasse periculoso curationis genere, quo vigesimus, aut trigesimus sit necatus. Erastus disp. de propr. medic. c.65. And there is this to be said in *Justification* of *that Course*——that those who have most *decried it*, and raised their repute upon a *different* way, yet have *practised* with *it*. *In ipsius Paracelsi scriptis passim laudantur remedia morborum vulgari modo & composita & præparata. Etiam Petrus Severinus teste Paludano, Medicamentis Paracelsicis non semper usus est, verum & compositionibus Galenicis sæpe.* Nor are *Paracelsus & Petrus Severinus Danus* singular in *this action*: it is the common usage of *Quercetan, Grollius*, and *Hartman*; not to mention Dr. *Willis*: I shall adde, that *Chymical* medicines have never or very seldom answered their *expectation*, which men raise of *them*: and whosoever shall inquire into the credit which *Paracelsus, Petrus Severinus, Phedro*, or *Scheunemannus*, or *Helmont* gained by these *refined Medicaments*, he shall observe that either *they* are infamous for their *destructive* courses of *Physick*, or at best atchieved nothing beyond other *Mortals*, except by *Chance*. In fine, though I have seen very *good success* of many *Chymical* Medicines; yet dare I not express so great an *admiration* for them as Mr. *Glanvill* declares: and if *he* in all the *number* of his *Philosophick* friends, had but *one* understanding *Physician*, or *two*, they would tell him, That there are some diseases *in themselves*, or *by accident* incurable; that men will die under the most able *Physicians*, and that the most *best* and *innocent Physick* will *sometimes* have effects *different* from the *wishes* and hopes of the *Doctor*: and he would finde that by *ordinary medicaments not purged from their dregs*,, nor exalted into *spirits* and *essences*, as *great Cures* are done by *Countrey-Physicians* and *Coun-*

Conring. de med. *Herm.* c.21.p.279. *Paludan.* epist. ad *H. Smet.* Ea habetur in *Bartholini* cista med. in vita *Severini*, p. 127.

Vide *Conring.* de med. *Herm.* c. 25 p.358,&c. de *Paracelso*, de *Phedrone*, & Pharmacis *Paracelsicis* vide *Bernardum Dissennium Croneburgium* in def. med. veter. c.40,41,&c. & de *Petro Severino Dano*. Vide epistolam *Paludani*, ubi supra. De *Scheunemanno* vide *Rolfinc.* chym.l.1.c.18.p.51.

Nec *Paracelsi* sectatores probo, qui medicina *dogmatica* explosa & relicta, *Elixir vitæ, quintas essentias, Axungiam Solis & Lunæ*, &c. & alia pernicios a & deterrima pharmaca in parva dosi, magno cum supercilio exhibere solent, ægrorum palato consulere volentes: cum hoc titulo tenus saltem medicamenta sint, ipsorum quidem opinione singularia, revera autem *mortis fercula & pocula*, quibus plerumque corpus humanum vehementer exagitatur, & magna cum jactatione fatigatur, & ita debilitatur, ut aut ægre aut nunquam amplius, pristinas vires recuperet. *Gabelchover.* Cent.6.hist.7.in annot. p.24.

Countrey-Gentlewomen oftentimes, as any ever were wrought by *Chymistry*. The Physick which is celebrated in the Scripture, that which *St. Luke*, St. *James*, *Cosmas* and *Damianus*, *Joannes Damascenus*, and *others* followed, was that which our *Divine* scruples, at least it leaves *dregs in the body*.

I confess that among the *Egyptians*, and *Arabians*, and *Paracelsians*, and some other Moderns, *Chymistry* was very *fantastick*, *unintelligible* and *delusive*; and the *boasts*, *vanity*, and *canting* of those *Spagyrists* brought a *scandal* upon the *Art*, and exposed it to *suspicion* and *contempt*: but what the *Society* have done in order to its *improvement*, I understand not so well as Mr. *Glanvill* seems to do: the Treatise of Dr. *Willis* about *Fermentation* was writ before he was of that number: and I know not how he hath improved *Chymistry* much since. And in that famed *Piece*, all is not to be reckoned upon as *invented* (much less is *improved*) that is *written*. Those that have *improved* it most, and made it *intelligible*, are *Beguinus*, *Grollius*, *Quercetan*, *Hartman*, *Angelus Sala*, *Schroder*, *Zwelfer*, *Sennertus*, *Glauber*, and others, that never conversed with the *Society*, whose *Improvements* are not *mentioned* by Mr. *Glanvill*, though so *great*, that (considering what men now write or do, is but by their *Example*, and after they had removed away all difficulties) all that our *Inventors* have done, doth not *deserve to be mentioned*.

His notion of Fermentation, *as thereby he expresseth the* natural *and* præternatural *occurrences in our bodies, is taken from* Bellich. de fermentat sect. 8 9. *His notion of the* fire in the heart *it very near related to the doctrine of* Conringius de calido innato; *and the comparison of the* blood *with* wine *is derived from* Carolus Piso: *so that those things* (*which are the principal in his book*) *seem rather* illustrated excellently well, *then* new discoveries *and* Hypotheses.

I shall adde, that we owe not only the *invention*, and rude improvement of Chymistry to the *Disputative* followers of *Hippocrates*, *Aristotle*, *Galen*, those *superstitious Porers upon the Writings of the Ancients*, those ridiculous *Schoolmen*, and *Monks*, and *Physicians*, but even the *present credit* and *esteem* which it hath in the *world*, and upon which it hath so farre *advanced* it self. It was not *Paracelsus* with all his *noise* and *Insolence*, but the *Dogmatical Physicians*, who observing the benefit thereof in *Pharmacy* gave it *fame*, and introduced

troduced it into the *Shops*, and *Cabinets* of *Princes*, and the uſe of *ſerious* and *conſiderate* Perſons. *Crato* introduced it into the *Emperours Court* at *Vienna*: not a *Chymical* Oyle, or *Extract* was prepared there, till he gave *Encouragement* to the thing. So did *Eraſtus*, a greater enemy to *Paracelſus* than to *Chymical Phyſick*: as appears by that ſaying which he uttered in the midſt of his *Diſputes* and animoſities againſt the *Paracelſians*. *Equidem ne abſoluta eſt Ars noſtra ſine diſtillatoria.* And had not *Langius*, *Auderna-cus*, *Geſuerus*, *Fernelius*, *Zwingerus*, *Schegkius*, *Augenius*, *Minadous*, *Matthiolus*, *Libavius*, and many other *Phyſicians* of the *Hippocratical* way introduced the *ſober* and *honeſt practice* of it, and rendred it *helpful to common life*, perhaps our *Virtuoſi* had never medled with it, at leaſt not have been *able to give it any eſteem in the world.* But now that the *Galeniſts* and *Ariſtoteleans*, (as they are commonly called) have refined it from its *droſs*, and caſt off the *Chryſopoietick* and *deluſory deſigns*, and *magical intermixtures*, and *Roſicrucian vapours* and *ſuperſtitions*, all which *they* effected; and gave Mr. *Glanvill* the opportunity of this *Cant*, with which I conclude this diſcourſe.

Crato medicin. ep 137. *Eraſt.* adv. *Paracelſ.* part. 4. p. 285. & de metall. c. 8.

Sennert de conſ. chym. c. 2.

Mr. *Glanvill*, p. 12.

"*I confeſs*, Sir, *that among the* Egyptians, *and* Arabians, "*and* Paracelſians, *and ſome other* Moderns, Chymiſtry *was* "*very* phantaſtick, *and* unintelligible, *and* deluſive: *and the* "boaſts, vanity, *and* cantings *of thoſe* Spagyriſts *brought a* "*Scandal upon the* Art, *and expoſed it to* ſuſpicion *and* con- "tempt. *But its late* Cultivators, *and particularly the* ROY- "*AL SOCIETY have refined it from its* droſs, *and made it* "honeſt, ſober, *and intelligible, an excellent* Interpreter "*to* Philoſophy, *and help to common life. For they have laid* "*aſide the* Chryſopoietick, *and* deluſory deſigns, *and* vain "tranſmutations, *and* Roſicrucian vapors, *Magical* Charms "*and* ſuperſtitious ſuggeſtions, *and formed it into an* inſtru- "ment *to know the* Depths *and* Efficacies *of Nature.* — All this *without diſpute* the *Society* hath done; and *without diſputing.* And *hereupon* I do agree with our *Virtuoſo*, that *they have no ſmall advantage above the old Philoſophers of the Notional way.*

Perhaps not ſo deluſory as Mr. Glanvill *thinks: but I am ſure the projects ſome go upon are deluſory, have much of the* Roſicruſian *humour in them: and the deſign of introducing a* ſenſible Philoſophy *is the pretence of* Cr ollius, *and of the* Roſi- crucian *Order.*

Of

Of Anatomical Improvements.

"WE *have another* advantage *above the* Ancients *in* "*the* ſtudy, uſe, *and vaſt* Improvements *of* Ana- "tomy, *which we find as* needful *to be* known *a-* "*mong* us, *as 'tis wonderful 'twas* known *ſo little among the* "Ancients, *whom a fond* Superſtition *deterr'd from* diſſecti- "ons. *For the* Anatomiſing *the* bodies *of* men *was counted* "barbarous *and* inhumane *in elder Times*: *And I obſerve* "*from a* learned man *of our own, that the* Romans *held it* "*unlawful to look on the* Entrails. *And* Tertullian *ſeverely* "*cenſures an* inquiſitive Phyſician *of* his time *for this pra-* "*ctice, ſaying, That* he hated man, that he might know him. "*Yea, one of the Popes* (*I take it 'twas* Boniface 8.) *threatens* "*to* excommunicate *thoſe that ſhould do any thing of this* "then-abominable *nature. And* Democritus *was fain to ex-* "*cuſe his* diſſection *of* Beaſts, *even to the great* Hippocrates. "*Nor does it appear by any thing extant in the writings of* Ga- "len, *that* that *other* Father of Phyſicians *ever made any* "Anatomy *of* humane *bodies. Thus ſhy and unacquainted was* "Antiquity *with this* excellent Art, *which is one of the* moſt "uſeful *in humane life, and tends mightily to the* eviſcerating "*of* Nature, *and diſcloſure of the Springs of its Mo-* "*tion.*

Plus u'tra, p. 12.

I have ſet down without any interruption the words of *this* Engliſh *Bravo* and *Hector* of *our Modern Philoſophers*, that my Reader might come with a *greater expectation* to the peruſal of my *Animadverſions*: ſo high a charge of *ignorance* upon the *Ancients*, ſuch *uſeful diſcoveries* of the *Moderns* render the *former* to be contemptible *fellows*.

and the latter a very *beneficial* and *important party* in this *Age*. But if it do appear that the *Moderns* have not as yet convinced us by their *works* and *great performances* in *Physick*, that the knowledge of these *new inventions* is so necessary to *Physicians*, and so *advantageous* to *mankind*, but that those which either *slight* or *ignore* their *discoveries*, acquire a *greater* repute, are *more* employed and possessed of a *more honourable* and *gainful practice*, and, in fine, do *greater Cures* in general, then our *Braggadochios*; then is there no such reason for *this Triumph* of Mr. *Glanvill*, as he imagines. The better to judge hereof, I desire all considering men to look back upon the several *Physicians*, who have flourished in *Greece*, *Rome* and *Barbary*, and to view the present state of *Physick* in *Italy*, *Spain*, and *France*, and try his most *severe judgement* if it be possible for him to condemn that *Physick* as *imperfect* and *pitifully deficient*, which gave that credit to *Hippocrates*, *Galen*, *Rhases*, *Avicenne*, *Fernelius*, *Lacuna*, *Mercatus*, *Vallesius*, *Christophorus*, and *Thomas a Veiga*, *Claudinus*, *Massarius*, *Septalius*, *Rondeletius*, *Hollerius*, *Ballonius*, *Rodericus a Castro*, *Fonseca*, *Saxonia*, *Sennertus*, *Crato*, *Prosper Alpinus*, *Antonius Musa Basavola*, *Hofman*, and many others (whom I shall not name; as indeed I name these without any order) which *they* now enjoy. Let him set his most *ambitious thoughts* on work, and see if he can propose to his *desires* greater things then they attained unto, and atchieved. Let him employ all his *envy*, and yet condemn their *Diagnosticks*, *Prognosticks*, or that *Secretorum Secretissimum*, their *method of curing*, and their *Medicines*. If there be *little* or *no fault* in *these parts*, it signifies not much what *principles* they went upon in *Philosophy*, nor whether they did *mistake* or *ignore* some things in *Anatomy*, as long as they were not *such* as hindred a *Physician* from the obtaining of that *end* which is designed by his *Art*: And as to the improvement of the *Therapeutick* part of *Physick*, by *new Medicaments*, or *new* and *more pleasant* preparations of *old Medicaments*, if they be *no more efficacious* then the *former*, we pay to the *Inventors* those acknowledgements, which we do to the introducers of *new garbs* and *fashions of clothes*, the best

beſt contrivances whereof, howſoever they may *excel in conveniency*, cannot be endeared unto us by the repreſentations of being *neceſſary*. I have named *practical Phyſicians*; I ſhall now inſtance in *Chirurgery*: What man is there in this Age, that would not be content with the repute of *Ingraſſias, Veſalius, Fallopius, Carcanus, Aquapendens, Spigelius, Marchettis, Severinus Paræus, Chalmetæus, Pigræus, Guillemeau, Hildanus, &c?* or what man is there in this *inquiſitive Age*, that any ſober man would compare with *them*, much leſs *prefer* before *them?* If the Poſture of *Phyſick* be ſuch, and that the value we ought to place on every thing be to be regulated by its *ſubſerviency* and *conduciveneſs* to ſome end, (*finis conciliat mediis gratiam*) it is eaſie to judge what *certain eſteem* we are to put upon the *modern Improvements of Knowledge* in order to *Phyſick*, and how far we may juſtly cenſure the *Ancients*, and ſuch as either *ſlight* or are *ignorant* of *them*. I profeſs my ſelf not to know what diſeaſe it is that the *Virtuoſi* cure *better*, or with *more certainty* then thoſe that follow thoſe other of the *Dogmatical* way. If it were *done*, there would not want ſuch as ſhould cry ſuch *performances* up; beſides the intereſt of the *Novelliſts*, the ſence of their *great Cures*, would gain them all the practice that is now in the hands of ſuch as vary not from the *ancient Method*, and *Rules of that Art*. I ſhall adde, that I could demonſtrate by *undeniable teſtimonies*, and ſuch as are confirmed by *modern trials*, that the introducing of *new Medicines*, either *Chymical*, or *otherwiſe*, and the neglect of a *diffuſed reading*, hath occaſioned the *diſ-uſe* and ignorance of ſeveral *Medicines* for *Conſumptions*, the *Gout*, *Plague*, and other grievous diſeaſes, which might be attempted with much more *aſſurance*, then is to be placed upon the *later Methods*. To proſecute this point further, I ſhall tell you, that *Phyſicians* hitherto looked with a great *indifference* upon the *Principles of natural Philoſophy*, whether they were *true*, or *no*; ſo that they did but ſerve as convenient *Memorials* to regulate them in their *practice*, and that *they* did guide them to their wiſhed *end* with *ſuch certainty*, as if they were *true*. All *diſputes* about *Natural Philoſophy* that did not refer to

practice, they looked upon as *Curiosities*, going beyond their *Art*, and about which they would not contend, so as that the *Method of curing* were not undermined thereby. Upon this account they did allow of two sorts of *Truth*, the one in *Physick*, the other in *Natural Philosophy*, and that what was *such* in *one*, might not be *such* in the *other*. This *President* they derived from their great Master, *Hippocrates*, who in his discourses sometimes proceeds upon the *Doctrine of the four Elements*, as if that were *true*: Sometimes he goes upon the *doctrine of Atomes*, as if he regulated his *Cures* thereby: sometimes he seems to favour the Tenets of the *Chymists*; and he cries out as Mr. *Boyle*, and other *Chymists* cite him, *Non calidum, frigidum, humidum, siccum esse quod maximam vim agendi habet in corpore, verum amarum, & salsum, & dulce, & acidum, &c.* Somtimes he proceeds as it were upon the principles of the old *Methodists*, and ascribes the origin of diseases to the *altering of the texture of the body*, to the *different conformation of parts*, the *different configuration of pores*, *&c.* This was the course that *Great Man* took: he was willing to observe in all diseases the *motions* and the *course Nature* took; to take those for *ill signs* and *symptoms*, which he found to be such from that *great Instructor*; however ἀπαίδευτα καὶ ἐμαθήσατα, those ways whereby *Nature* did *usually terminate* diseases, were the ways he thought they *ought* to be terminated by; and he made that the *scope* to be aimed at in the *curing* of *diseases*: those *evacuations* that had helped *naturally* to cure, he endeavoured to promote *artificially*, by such *Medicines* as *Experience* shewed to be serviceable to *those ends*, when administred at *due times* and *seasons*. In *short*, he made himself absolutely the *slave* of *Nature*, attended on *her motions*, sometimes gently *leading* her on, as it were a *Gentleman-Usher*; sometimes *following* her, as a *Page*, never pretending to *command her* by his *Medicines*: So cautious he was, that he would not adventure to *do good unseasonably*, and at other houres then his *Teacher* directed him, lest he should *do harm*: he would not adventure to *shorten* a disease, lest he should *shorten* his *Patients life*. As if he had foreseen the truth of that observation, which *Vallesius*, and others in these days experiment, *Celerior quam*

See Otto Tachenius's Hippocrates redivivus. *and his* Clavis Medic. Hippocr. Devet. medic § 24 *Concerning the meaning of which place see* Erastus adv. Paracel. p. 3. pag. 96 & Conring. de Hermet. med. c. 16 p. 191.

quam pro morbi longitudine curatio, detrahens plus virium quam pro morbi ratione, facit in tempore curandos ante tempus mori. Agreeable to this Method of *Hippocrates*, was that counsel which Dr. *Bathurst* (of *Black-friers*) gave me, when I first seriously set my self to study and observe his practice in *Physick*, viz. *Nunquam ille Medicus magnus erit, quisquis patitur sese principiis Philosophicis alligari atque constringi.* It is impossible for any person to be a *great Physician*, who ties up himself to one sort of *Natural Philosophy*, as if it were *really true* and *certain*: the operation of *Medicaments* is oftentimes such as answers not the *Principles* of any *Philosophy*, and the digestions of *Nature* are so different from those of *Chymistry*, her *fires*, her *solvents*, her *filters*, her *furnaces* & *vessels*, her *mixtures* and *degrees of heat* so *discrepant*, that there is no arguing from the *one* to the *other*: nor is there any thing to be *relied* upon in *Physick*, but an exact knowledge of *medicinal Phisiology* (founded upon *observation*, not *principles*) *semeiotics*, *method of curing*, and *tried*, (not *excogitated*, not *commanding*) *medicines*: where this course fails (as somtimes it will) we then try *uncertain Medicines*, rather then abandon the *Patient* to those *Prognosticks*, which are seldom so *fatal* as to destroy *all hope*; and where *Skill* is at a loss, we frequently behold *Chance* to be *successful*. And *this last* is the *Mystress* of our *Reforming Physicians*, it is under *her* conduct that *they* will enrich our *Therapeutick* part of *Medicine*, and alter our *Method*. I shal not enlarge further hereupon, being content to have shewed what esteem *Physicians* have had *Philosophy* in, and how they have had as little regard to the *truth* of their *principles in natural Philosophy*, as a man ought to have to the *hand of a Dial*, or which *points out the way to any place*: It is *not requisite* that it be a *real hand*, whatever men *call* it; nor would we endure the *impertinencies* of any that should go about to perswade us out of *our way*, because they that cald that an *hand*, were mistaken: In sum, so the *way* be *good* and *certain*, I am content to be one of those whom the *Italian* Proverb commends, for going that way which the *Mules* go. *Ito qua Muli eunt*. In this opinion I have amongst late Writers the learned *Hofman*, whose words are these, *Quæ enim necessitas est Medicum semper loqui cum Physico, siquidem usus, à quo pendet ars nostra, aliud velit, vel certe permittat? Quid enim ibi VERITAS est, hic UTILITAS est.*

Consultius esse nullus nescit tempore paulo longiore & tuto curari, quam paulo breviore cum certo vitæ periculo sanari. *Erastus* disput. de propriet. med. c. 65. sub finem.

Instit. med. l. 2 c. 7. sect. 11, 1, &c. & Adrianed. c 1.

Nor

Jo Ant. Vander Linden *de circuitu ſanguin. exercit.* 1. *ſub finem.*

*N*or will it be amiſs to propoſe the Judgment of the learned Practitioner *Joannes Antonides Vander Linden,* which he paſſed not long before his death at *Leiden* A.D.1659 after a mature conſideration of all the *new ſpeculations* in *Natural Philoſophy,* which this *laſt Age* had produced and acquainted him with. " *Phyſici ab* imaginariis *incipiunt, per* ratio-
" cinia *pergunt, & in* frivola *deſinunt.* Cordatos *obteſtor, an*
" *apud ſe non* πᾶν ὑπόληψις? *Ad quid igitur* Phyſica, *ut nunc*
" *conſtituta eſt,* Medico? *Etiam quæ nunc docetur* optima
" (*præter quod* Principiis *nitatur* non neceſſariis, *& ob id*
" certa *non ſit*) *quid ad* medendnm, *ſi ſcitur,* utile; *aut, ſi*
" *neſcitur,* noxii *confert? Etiam, ſi extaret, quæ* abſolute cer-
" tis *principiis & perfectis regulis conſtaret, tamen* Medicinæ
" *non eſſet, niſi* Inſtitoria, *non* Inſtitutoria. *Inſtitoria, in-*
" *quam; namid* Medicis *eſt* Phyſica, *quod* Fabris *omne ge-*
" *nus taberna mercium Novicarum.* Inſtituriam *Medicinæ*
" *qui volunt, næ illi ſciunt, quid velit detritiſſimum,* ubi de-
" ſinit Phyſicus, ibi incipit Medicus. *Medicina non habet*
" *opus* aliena; *nedum a* Phyſicis ficta *& emendicata prin-*
" *cipia*: *habet* ſua, & certa, & auſa ſtare *contra omnem* du-
" bitationis *impetum. Qua fiducia concludo*: Phyſica ho-
" dierna optima *Medicinæ parum aut nihil* utilis *eſt.* Qui
" habet aures ad audiendum audiat, *mentemque ſanam in*
" *corpore ſano habeat.* *Saltem* vos, vos *iterum alloquor* χαριέ-
" ϛατοι παῖδες, ſapite; *& ab* ea *quæ* Medicinæ larva *ſe tegit,*
" Phyſica *cavete*; *& hoc agite, ut quam aliquando ſalutis hu-*
" *manæ præſidem* Artem *in* bona conſcientia *vultis facere, eam*
" *ante cum certo fructu* regia via *velitis diſcere.*

Upon this account I often laugh at our modern *Virtuoſi,* when they dilate themſelves with a great deal of *oſtentation* and *confidence,* about the *qualities* and *correctives* of *Opium,* whether it be *hot* or *cold?* which controverſie *how great ſoever,* hath no influence upon *practice,* becauſe both agree pretty well in the caſes in which it is to be *uſed,* and many of the *modern preparations* and *corrections* are *fooliſh,* and make it *worſe*; And as to that *Laudanum* of *Helmonts* amongſt the *Virtuoſi*; I have ſeen much more *ſimple* preparations *ſtupifie leſs,* and produce *greater Cures,* then that did when

when made by the hands of one of the *Society*, and given by another of it: whilſt the beſt of *Modern Chymiſts*, *Zwelfer*; beſtows this commendation upon that old medicine of *Archigenes* and *Meſues*---*Erit ſic rite præparata opiata, quæ merito Laudani opiati, multarumque aliarum Opiatarum vices ſupplere poſſet*. I could enlarge here, but that Mr. *Glanvill* will think I have forgot *him*.

Pharmacop. Auguſt in conſ. Archigenis.

Having made this general *Apology* for *Phyſicians*, which is ſufficient to juſtifie *them*, both as to their *care of their Patients*, and their *skill*; I ſhall come to apply my diſcourſe particularly to Mr. *Glanvill*. It is hard to reconcile the *neceſſity* of *Anatomy*, with the *Moſaical Conſtitutions*, it ſeeming ſtrange that *God* ſhould make it ſo *unclean* a thing for any one to *touch a dead body*, and yet the *knowledge of Sceletons* ſhould be ſo *neceſſary*. To ſupply this, the *Jewiſh Rabbins* ſay, that *God Almighty* did reveal unto *Moſes* the accurate knowledge of *Anatomy*: and when we conſider how *they embalmed* their *dead*, and that *embalming* doth infer a *knowledge of diſſection*, and of the *Entrails*; when we obſerve (out of *Buxtorfs Synagoga*) that artifice with which the *Jews* kill all *Animals*, thereby to let out the *blood* exactly: when we conſider that the multiplicity of *accidents* in *war*, or otherwiſe, would render the knowledge of the *inward* and *outward* parts *neceſſary* to them, and *experience* acquaint them with their *nature* (not to mention ſome *Jewiſh* relations about the opening of the *Os pubis* and the *partus Cæſareus*) I am apt to think that the *ancient Jews* were not ignorant of *uſeful Anatomy*, nor ſo *ſuperſtitious* as *totally* to avoid the *practice* of *it*; nor dare I ſay (with our *Virtuoſo*) ſuch *Superſtition* is *fond*, which is *aſcribed* to *God* as its *immediate Author*.

Vid. Riolan. *Anthropogr. ph. l.* 1. *c.* 3.

As for the *Greeks*, the ſtudy of *Anatomy* was very ancient amongſt them, ſince it is attributed to *Alcmæon*, that ancient Phyſician (a Scholar of *Pythagoras*) as the firſt Author of it, if we will believe *Chalcidius* upon the *Timæus* of *Plato*. From *him* it was derived to poſterity by *tradition* and *manual operation*, children being bred up unto it, ſuch as were to be *Phyſicians*, as alſo *Philoſophers*. *Sō Democritus*, *Hippocra-*

tes,

tes, and many others came to be acquainted with it. But none of the *Ancients*, until the time of *Diocles Caryſtius*, did write any thing about it: which notwithſtanding, *that Science* ſeems to have been in never the worſe condition, as *Mercurialis* thinks. *Anatomen etſi a nullo veterum uſque ad Dioclis ætatem Scriptis mandatam referat Galen. in 2. de anat. admin. melius tamen ſic conſervatam & amplificatam inde intelligere poſſumus, quod tunc homines a primis annis Anatomen (ut cæteras artes,) non ex ſcriptis ſed ex Parentum ſermonibus ipſaque exercitatione addiſcebant; ſicque melius ipſam comparantes, non modo tenacius in animis ſervabant, verum etiam aſſiduis ſtudiis augebant.* But to put this queſtion more out of doubt, I ſhall appeal to *Galen*, who could give a better account of what they did in the *elder times* then Mr. *Glanvill*. I have not his Works by me; but *Lacuna* in his *Epitome* thus expreſſeth him. "*Quod veteres nihil ſcripſerint de conſectionibns adminiſtrandis, vertendum illis vitio non eſt: quandoquidem erat iis tum frequens tanque in communi uſu ipſa Anatome, ut domi apud Parentes etiam ab ipſa pueritia, in illa omnes olim exercerentur. Poſtea vero tam præclaro illo exercitio intermiſſo, opus certe nobis fuit Commentariis, quæ Anatomicam diſciplinam Chirurgicæ medendi rationi maxime neceſſariam, integram conſervarent.* That *Ariſtotle* did diſſect the bodies of men is manifeſt out of his *Hiſt. Anim. l.* 3. where he informs us how *he* made an inquiry into the *nature* and *ſeries* of the *veins* in *humane bodies*: and as to *his* anatomizing of other creatures, *beaſts, birds, fiſhes, inſects,* (and how he had ſome *thouſands* employed under him *to that purpoſe*) no man can doubt who reads *Riolanus* and *Pliny l.* 8. *c.* 18. How accurate he was (however his brevity doth not repreſent every circumſtance, nor fully deſcribe things) we

Hieron. Mercurialis Var. Lect. l. 1. c. 16.

Theſe Anatomical *operations of the* Youth *were calle.* ἐγχειρήσεις ἀναϛομικὸς, *which* Hofman *thinks may be rendred fitly in* a ine. Exercitia Anatomica. *Adding*, Didiceram enim ex ejus operis (apud *Galenum*) l. 2. initio has ἐγχειρήσεις ab ipſo artis incunabulo fuiſſe *puerorum in* familia *Aſclepiadeæ*, altorum ad factitandam *medicinam*. Sciebam etiam aliunde, longe alium fuiſſe tum *Anatomiæ* rationem, quam nunc eſt, ſeorſim inquam fuiſſe traditam hiſtoriam partium ipſarum, *ſemperq fultam oculari inſpectione*. Vide *Hofman* Var. Lect. l. 2. c. 13. *The ſame is avowed by* Veſalius *in his Preface to* Charles V.

Vide *Riolan.* Anthr. pograph. l. 1. c. 4.

I would not be underſtood to juſtifie every paſſage *in* Ariſtotle *relating to* Anatomy: *he hath many groſs errours* operis in longo: *but have not alſo* Harvey, Highmore, Silvius, *and others, ſo many as may excuſe his* incogitancy *ſometimes?*

Lacuna Epit. *Galen* de anatom. admin. l. 2.

we may judge by this that there are few of the *new inventions*, but are aſcribed unto him; and Dr. *Harvey* is known commonly to have ſaid, *Nihil fere unquam in ipſis Naturæ penetralibus inveniſſe ſe, quin cum Ariſtotelem ſuum penſiculatius evolveret idem ab illo, aut explicatum, aut ſaltem cognitum reperiret.* After *Diocles*, I find theſe other reckoned as notable *Anatomiſts* by *Volcherus, Coiter*, viz. *Polybius, Eraſiſtratus, Calliſtus*, all Scholars of *Ariſtotle*: And after them *Marinus*, and *Lycus*, the Maſter of *Galen*, and *Satyrus*, and *Pelops*, and *Numeſianus*, beſides ſeveral others at *Alexandria* all which *Galen* went to converſe with. But I muſt not paſs by *Herophilus* without an eſpecial *Character*, who did not only correct the *miſtakes* in *Anatomy* which his Maſter *Praxagoras* fell into, but by his *induſtry* and *skill* acquired a repute ſo great, that his name is equal to the moſt famous that ever were *before*, or *ſince* his time: This great man is preferred by *Veſalius* before *Galen*: And it was an uſual ſaying of *Fallopius*, that any man might as eaſily contradict the *Goſpel*, as contradict *Herophilus* in Anatomy. *Contradicere Herophilo in Anatomicis eſt contradicere Evangelio.* This *man* is that *inquiſitive Phyſician*, of whom Mr. *Glanvill* ſpeaks, and who is blamed by *Tertullian* not for *diſſecting humane bodies*, but for diſſecting them *alive*, which he terms *Butchery*. Becauſe, I think Mr. *Glanvill* never read him, and becauſe I will make it *evident* that *one of the Ancients* did diſſect more *bodies of men*, then all the *Society* put together, and that with an *extraordinary caution*. I ſhall ſet down the words of *Tertullian*, and they are theſe,—— *Herophilus ille Medicus aut Lanius, qui ſexcentos eexecuit ut naturam ſcrutaretur, qui hominem odiit ut noſſet, neſcio an omnia ejus interna liquido explorarit; ipſa morte mutante q quævixerant, & morte non ſimplici, ſed ipſa inter artificia exectionis errante.* Upon which paſſage, *Philip le prieur* notes thus, *Anatomia quæ & celebris magnoque in precio fuit apud Ethnicos, a veteribus Chriſtianis odio quam maximo afficiebatur. Quamvis hic dictum Lanium Herophilum conſtet, quod vivos homines diſſecaret. Id autem facere ſolitos Eraſiſtratum, Dioclem, & Herophilum docet Claudius Galennus* 8. de plac. & 2. *anatom. adminiſtr.* Agreeable to

Dr. *Pearſon* in Dedic. *Laertii* ad *Carol. II.*

Vol. Coiter intro. in anat. c. 6 Galen *in his Coment upon* Hippocrates de nat. hum. *reckons up above* 10 *eminent Anatomiſts of the ancients.* Vide *Riolan.* Anthropogr.

Mœlius fundam. med. c. 1. p. 10. & *Voſſius* de philoſ. c. 11. ſect. 2.

Tertullian. de anima. c. 10. *Gagnæus, Mercurialis,* & *Voſſius* read it *ſe, lingertos exſecuit.*

this

Celſus l. 1. in præcœmio.

of *Tertullian*, is that paſſage of *Cornelius Celſus* in his Preface. *Neceſſarium ergo eſſe incidere corpora mortuorum, eorumq; viſcera atque inteſtina ſcrutari, longeque optime feciſſe Herophilum & Eraſiſtratum, qui nocentes homines a regibus ex carcere acceptos, vivos inciderint, conſiderarintque etiam Spiritu remanente, ea quæ Natura clauſiſſet, eorumque poſituram, colorem, figuram, magnitudinem, ordinem, duriciem, molliciem, lævorem, contactum: proceſſus deinde ſingulorum & receſſus, & ſive quid inferitur alteri, ſive quid partem alterius in ſe recipit.* This *Herophilus* was undoubtedly a perſon of *vaſt parts, great learning* and *curioſity*. He brought the *Hippocratica* Phyſick to its *heighth* and perfection, compleating the *Anatomica* part, and illuſtrating the Doctrine of the *Pulſes*. His followers had a *Schoo* not far from *Laodicea*, as *Strabo* ſaith, wherein it is not to be doubted but that *Anatomy* was taught, and ſo in that other School of *Eraſiſtratus* at *Smyrna*.

Strabo Geograph. in fine lib 12. citante *Mercuriale* Var. Lect. l. 2. c. 12.

Μεταξὺ δὲ τῆς Λαοδικείας καὶ Καρύρων ἱερὸν ἔστι μηνὸς Κάρυ λαλύμενον, Τιμώμενον ἀξιολύγως. Συνέστηκε δὲ καθ' ἡμᾶς διδασκαλεῖον Ἡροφιλείων ἰατρῶν μέγα ὑπὸ Σεύξιδος, καὶ μετὰ ταῦτα Ἀλεξάνδρου τοῦ φιλαλήθους καθάπερ ἐπὶ τῶν πατέρων τῶν ἡμετέρων ἐν Σμύρνῃ τοῦ τῶν Ἐρασιστρατείων ὑπὸ Ἰκεσίου From whence it is clear, that in the Reign of *Auguſtus Cæſar* (when *Strabo* lived) *Anatomy* in the *Eaſt* was in great requeſt, and that the *Phyſicians* and followers of *Herophilus* had a great *Academy* betwixt *Laodicea* and *Garura*. And that before thoſe times at *Smyrna, Eraſiſtratus* that was a great *Diſſector* of men (even *alive*) had another *Academy* of his followers: whoſe works though they are loſt, yet *Veſalius* ſaith, that one may conjecture out of the paſſages in *Galen* that relate to them, that they were very *accurate* Anatomiſts. —— *Veteribus diſſectionum proceribus, quos ex Galeni libris in corporum anatome ſedulo verſatus eſſe nobis perſuaſum eſt.*---- Not much unlike this character of *Veſalius* is that Elogy which *Veſlingius* beſtows upon the Ancients in an Epiſtle of his to C. *Hofman*, enquiring whether the *venæ lacteæ* of *Aſellius* were a part of the *porta vena* known ſo long ago? *Sic habeas, incertum mihi eſſe quid primi illi qui ante Dioclis Caryſtii ævum privatis diſſectionibus in corporis humani partes inquirebant hic viderint,*

Veſalius de rad. Chinæ, p. 168.

cum

cum nihil eorum quæ cognorant ſcriptis divulgarint. Vixere fortes ante Agamemnona multi, *ait* Lyricus: *& proculdubio ante* Herophilum *eximii, & in hoc diſſectionum ſtudio exercitatiſſimi, quos ob monumentorum defectum longa nocte oblivio premit.* Veſlingius Ep.20. edit. per *Bartholin.*

I ſhall conclude this diſcourſe of *Herophilus,* with an obſervation about the time when he lived; which was not in the days of *Tertullian,* though Mr. *Glanvill* repreſents them as *Contemporaries*: but many Centuries before, in the time of *Ptolemæus Philadelphus,* and he is famed for his raillery upon *Diodorus Cronus,* who denied there was any *motion,* yet had his *ſhoulder diſlocated.* See *Conring.* de medic. Hermet. c.9.p.83. Some make him more ancient, but none ever brought him ſo low as our *Virtuoſo.* Vide *Voſſ.* de Philoſ.c.11, *Jonſium* de Script.Philoſ.l.1.c.15.

As to the *Romans,* and their skill in *Anatomy,* I cannot ſay much of it, except it be to their *diſparagement.* They were a *military* ſort of people, *rough-hewen,* and thought *all that* below their *ſtudies* or *ſerious thoughts,* which our *Experimental Philoſophers* boaſt of, and recommend unto our care with ſo much *vanity.* All the *Mechanick,* I had almoſt ſaid the *Liberal Sciences,* they thought to be *excellent* qualifications in their *ſlaves,* not in *themſelves*: And they who gave *Laws* to all the world, ſcorned to be inſtructed by their *vaſſals,* and a *conquered* Nation. Upon this account, not onely in the time of *Tully,* but afterwards to the days of *Quintilian* and *Tacitus,* (I know not which writ the Book *De Oratoribus*) it is evident, that however many Gentlemen did inform themſelves of the ſeveral parts of *ingenious Learning,* yet did that *haughty people* behold thoſe perſons with *indignation,* and ſome thoughts of *hatred,* in ſo much as that thoſe who were beſt *verſed in it,* pretended ignorance and ſcorn of it. Things being in this condition, and the *Romans* having no other *Phyſicians* then their *Slaves,* it is not to be wondered if they were not eminent for *Anatomy. Cato* had baniſhed the *Phyſicians* long ago, and after-ages gave *them* little encouragement.

I do not at preſent remember any *Phyſician*, whoſe name hath any thing of the *Roman* till *Cornelius Celſus*, and after him *Vectius Valens*. *Pliny* ſaith, that even to his time, in the reign of *Titus Veſpaſian*, the *Romans* did not care to profeſs and practiſe *Phyſick*. *Solam hanc artium Græcorum nondum exercet Romana gravitas in tanto fructu: pauciſſimi Quiritum attigere, & ipſi ſtatim ad Græcos transfugæ: imo vero autoritas aliter quam Græce eam tractantibus, etiam apud imperitos experteſque linguæ, non eſt.* Nat. hiſt. l.29.c.1. In the time of *Auguſtus Cæſar*, his freed man *Artorius Muſa*, and his brother *Euphorbus* gave ſome credit to *Phyſick*, and afterwards ſeveral eminent *Greeks* are ſaid to have flouriſhed; but whether it were that the *Romans* were *impatient* to learn ſo much as was requiſite (or thought to be ſo) to make a man eminent in the *Hippocratical* and *Herophilian* way; or whether they thought *it* more becoming their *grandeur*, rather to learn (with all the world) a *new Method of Phyſick*, then ſeem to have been *ſo long* as it were *brutiſh* and *ignorant* in compariſon of the *Greeks*; or whether that the *new principles* and *method* were more agreeable to that *Empirical* way, they had been accuſtomed unto (See Plin.nat. hiſt.l.26.c.3.) and ſo more eaſily received by the *populace* then that of *Hippocrates* made up of a *Grecian* dyet, and *medicaments*; whatever was the reaſon, I finde that the Romans did generally incline to that Sect of *Phyſicians*, called the *Methodici*, begun by *Aſclepiades* and *Themiſon* in the time of the *Triumvirate*, or *Vectius Valens*, and compleated by *Theſſalus* in the time of *Nero*: This *Sect* ſeems to have had the advantage over all other the *Phyſicians* amongſt the *Romans* from the time of *Auguſtus*, to the reign of *Severus*, which is near three hundred years. *Pliny* calls *Themiſon*, *Summum authorem*, and by that place in *Juvenal* one would gueſs him to have been a man of *great notice* and *general practice* in the days he lived.

Ideo deſerta eſt hæc diſciplina, quia neceſſe erat in ea literas ſcire. *Pliny.*

During the flouriſhing of the Roman Empire, *the ſtudy of* Phyſick *was principally purſued at* Alexandria *in* Egypt. *There* Herophilus *and his Scholars had given* it *credit, and the* Empiricks *and* Methodiſts *had their* Academies, *and the* Jatroſophiſtæ *were endowed* profeſſors *The repute of* Alexandria *being ſuch even in the days of* Valentinian, *that it was credit enough for any* Phyſician *to ſay he had been* bred there. Ammian. *Marcell.lib.22.*

Plin.l.14.c.17.

Mer-

Morborum omne genus, quorum ſi nomine quæras,
Promptius expediam quot amaverit Hippia mœchos,
Quot Themiſon *ægros autumno occiderit uno.*

Theſſalus, againſt whom *Galen* and *Pliny* inveigh, was certainly a man, not only of *great Eloquence*, but alſo of *extraordinary Learning* and *Judgement*, as we may gueſs by thoſe parcels and fragments of that excellent man, which are all that remains of him, and they preſerved in the works of others. His Books *de Communitatibus & Syncriticis* are peeces whoſe loſſes I much lament. The Memory of his *Tombe* is not loſt upon which he inſcribed himſelf, ἰατρονίκη; or, *The Conquerour of Phyſicians*. His Letter to *Nero* had ſomething of a *gallant confidence* in it, which may become *Heroes*, and is juſtified in men of *great Learning*. *Cum novam ſectam condiderim, & quæ ſola vera ſit, propterea quod qui ante me fuerunt omnes nihil utile prodiderunt, vel ad ſanitatem tuendam, vel ad morbos propulſandos*---. The generality of his followers ſeem to have been excellent *Phyſicians*, as *Dionyſius*, *Proculus*, *Archigenes*, *Soranus*, *Attalus*, *Julianus*, and others. I ſhall not inſiſt upon a particular relation of *their tenets*, which one may ſee excellently illuſtrated by *Proſper Alpinus*. This ſect of *Phyſicians* ſeems to have left impreſſions of its *method* and *principles*, in all places where the *Roman Empire* ſwayed. They placed little value upon *the exact knowledge* of *Anatomy*, being content with a *general skill* therein, and enquiring no further than was *neceſſary*. They knew that the *Romans* had formerly baniſhed the *Phyſicians* (as *Archagathus*) from amongſt them, for uſing their *Patients* with much *cruelty*, *cutting* and *burning* them; and underſtood the humour of the *people* ſo well, how they diſliked the diſſections of *humane bodies*,

Proſp Alpin. de medic. methodica.

Quintilian *being to deſcribe* Phyſick, *renders an account of it agreeable to the* Methodiſts. In declam. 8. Gemini Languentes.

They called Gallen, *when he put himſelf forth in the world by the oſtentation of* Anatomy *and* Philoſophy, *Logiater*: Logiatri autem nomen ſui temporis medici Romæ Galeno per contemptum imponebant; ut ita eum traducerent, quaſi non reipſa, nec uſu, & exercitio artis peritus eſſet: Sed ad loquacitatem duntaxat & diſſerendum de iis quæ ad artem pertinent comparatus. *Geſner.* in Scholiis ad *Caſſium* p. 57.

bodies, especially *alive*, and therefore they closed with that *popular prejudice*, and turned it to their advantage; neither *dissecting of bodies*, nor tormenting them with those *odious* or *cruel methods of Cure*, which were practised by the followers of *Herophilus*. Nor do I doubt that those objections in *Celsus* against *Anatomy*, were put into his mouth by the *Methodists*, as well as *Empirics*, *viz.* that all *Anatomy* of bodies was a *nasty performance*; but to dissect the *living*, most *barbarous* and *cruel*: that as much of *Anatomy* as would instruct one sufficiently, might be learned in a *Camp*, where the *Physician* need not make wounds, but *learn* at once and *practice Cures*. Hence it was that the study of *Anatomy* was so much out of request at *Rome* in *Galens* time, that I think he mentions not *one* curious *Anatomist there*, though he tell how *Satyrus* taught *him* at *Pergamus*, and *Pelops* at *Smyrna*, and *Numesianus* at *Corinth*, and others. There were some that were excellent *Ostrologists* at *Alexandria*. And I am apt to think, that even *he* durst not for fear of publick *odium*, dissect any *living* men there, because, as *Celsus* saith, *most people held it to be cruelty*, and perhaps would not have *thought well of him*, who should have dissected any *dead men*. Whereupon he set up with *Apes*, dissecting *them*, as being neerest to *men* in resemblance, and imagining the *fabrick of their bodies* to have as great an *affinity* with the parts of *men*, as their *shapes* had; that this was the cause of many mistakes in him, is certain; and demonstrated by *Vesalius*. But that he never made any *Anatomies* of *humane bodies*, or considered any as they came in *his way*, is a *calumny* which might be refuted by sundry instances out of his Works, and some thereof are to be seen in *Riolanus* Anthopogr. l. 1. c. 12.

Vesalius *in his Treatise* de rad. Chinæ *sheweth how* Galen *dissected* Apes, *and was thereby led into sundry mistakes But even such as did blame* Galen *were themselves faulty, as* Vesalius *and* Columbus; *which appears by what they say about the* kidneys; *which they describe out of* brutes, *not* men, *as* Piccolomineus *and* Beverovicus *observe*. Beverovic. de calculo, p 3 *Read also* Fallopius *Observations*

Vesalius in dedic. lib. de fabric. corp. hum. ad *Carol.* V. Imper. *In the same place he cals* Galen, dissectionis professorum facile primarium.

Vesalius never raised his imputations to this heighth; all that he saith of *this nature*, is, *Nobis modo ex renata dissectionis arte, diligentique Galeni librorum prælectione, & in plerisque locis eorundem non pœnitenda restitutione constat, nunquam*

quam ipsum nuper mortuum *corpus humanum resecuisse. At vero suis deceptum* Simiis (licet ipsi arida, ac veluti ad ossium inspectionem parata hominum cadavera occurrerint) *crebro veteres Medicos, qui hominum consectionibus se exercuerant, immerito arguere.* Nay, it is evident out of *Galen,* that the *Roman* Physicians which were in the Army of *Antoninus* did dissect the *Germans* that were killed by him in battel. As for that *Learned man of our own,* out of whom he tells us, *That the Romans held it unlawful to look on the Entrails*: I know not who it should be. Mr. *Boyle* indeed doth say, that in *Galens time it was thought little less then irreligious, if not barbarous, to mangle the bodies of men*: which how far it is true, one may guess out of what I have said; But that *Honourable Person* speaks in such a manner as gives us *little of exception*; Mr. *Glanvill* is so peremptory, that I wonder that he did not deny, that the *Romans* did not use any *Augury* from the *inspection* of the *bowels, heart,* and *liver* of beasts; *or* that they did not eat the *Livers* of *Geese,* and other *Guts* of several *Animals.* This is so well known to every *School-boy* that hath read *Martial,* or *Horace,* or *Virgil,* that I need not speak of it. Had the *Romans* held it so unlawful a thing to behold the *Entrails* of *Animals,* I wonder they gave the name of *Visceratio* to those distributions of flesh which they publikely used: to such *unlawful* customs, *Virgil* would not have alluded, when he brings in *Dido* her self,

Galen.l.3. sec. gen.c.2.

——*Pecudumque reclusis*
Pectoribus inhians, spirantia consulit exta. Æneid.l. 4. v.64. & Georgic.l.1.v.484.
Tristibus aut Extis fibræ apparere minaces.

Nay, they carried the bodies of beasts open with their *Entrails displayed* to be sold publickly, as *Mart.* shews *l. 6. ep.* 64.

Ne valeam, si non multo sapit altius istud,
Quod cum panticibus laxis, *& cum pede grandi*
Et rubro palmone *vetus, nasisque timendum,*
Omnia *crudelis Lanius, per* compita portat.

But perhaps *he* will confine his discourse to the *Entrails* of men, why then did not he speak more plainly? And even in this case, that some *superstitious* persons might hold it *impious* and *unlawful* is possible:

and

and that others out of enmity to the *Anatomical Phyſicians*, (as *Pliny l.* 28. *c.* 1.) *Aſpici humana exta nefas habetur*, might call it ſo, I deny not. But what Law was there againſt it? How comes it to paſs, that *Celſus* in his debate about the *lawfulneſs of Anatomizing* even *living bodies*, ſaith (or maketh others to ſay) that it is only *cruel*, or *naſty* and *abominable*; not *impiety* or a *breach of Religion*? Beſides, *how* could any *Phyſician* in thoſe days have dreſſed ſuch wounds in which their *Entrails* either *guſhed out*, or were hurt, in caſe it had been *unlawful to look upon them*? It is manifeſt that *Celſus* ſaith, a prudent *Phyſician* may from *ſuch accidents* learn *Anatomy*; *Ita ſedem, poſitum, ordinem, & figuram, ſimiliaque alia cognoſcere prudentem medicum*, and adviſeth him to improve the occaſion: And he was a Perſon learned not only in the *Phyſick*, but *Civil* Laws of his *Countrey*.

I believe that place in Pliny *relates onely to* Augury, *that it was not* lawful *amongſt men t' make uſe of* humane bodies, *and ſearch* their bowels *to thoſe* ends: *this was* neſas: *but nothing elſe.*

To convince our *Virtuoſo* a little more, out of *Schoolbooks*, in which *he* ought to be converſant. Is there not a controverſie agitated in *Seneca*, Controverſ. l. x. contr. 6. about *Parrhaſius* the Painter? how he brought an old *Olynthian*, and diſſected him *alive*, thereby to draw the picture of *Prometheus* with a *vulture* preying upon his *Liver*! Is it not agitated *pro* and *Con*, by *Romans* and *Grecians*? Is there any one that ſaith it was *unlawful* for him to *behold the Entrails*? *Nay*, is it not ſaid in the midſt of *Rome*, that it was always LAWFUL? *In argumentis dixit, quantum ſemper Artibus LICUISSET, Medicos ut vim ignoratam morbi cognoſcerent, viſcera reſcidiſſe HODIE cadaverum artus reſcindi, ut nervorum articulorumque poſitio cognoſci poſſit.* In *Quintilian* is there not a *Declamation* Declam. 8. (*Gemini languentes*) in which the *Mother* accuſeth the *Father* for permitting the *Phyſician* to diſſect one of the ſick *twins*, thereby to diſcover the diſeaſe of the *other*! Doth not the *Mother* there *bid him* diſſect the bowels of the *dead youth*? *Differ ſaltem, pater, hanc calamitatem: quicquid ex filio facis, facies ex cadavere. Si deprehendi poteſt languor dum occidit, facilius cum occiderit.* Doth *ſhe* not deſcribe the cruelty of that *Anatomy* very tragically? *Paſſus eſt miſer diſcurrentem per omnia reſerati pectoris improbum vagæ artis errorem.*

rem. Contentum fuiſſe medicum toto homine diſcurrentem primo putatis aſpectu? Egeſta ſæpe vitalia, pertractata, diducta ſunt: fecerunt manus plura, quam ferrum. Stat juxta medicum pater apertis viſceribus inhians, ſtillantem animæ ſedem cruentis manibus agitantem: ne feſtinet, hortatur; jubet altius diligentiuſque ſcrutari: Interrogat, dubitat, contendit, affirmat, & accepit de filii morte rationem —— Inter hæc reficiebatur miſer hauſtibus, detinebatur alloquiis, comprimebatur reſiduus cruor, claudebantur aperta vitalia. Nemo unquam tam nova pertulit commenta fevitiæ, tanquam ſanaretur occiſus eſt--- Vos tunc putatis illius tantum languoris medicum quæſiiſſe cauſas? quæſivit quicquid neſciebat, & uſus occaſione rariſſima in omnem voluit proficere novitatem. After this *ſhe* tells in what manner *ſhe* gathered up his *bowels*, and by cloſing up his Corps fitted him for the Funeral. *Corpus quod medicus, quod reliquerat pater, hoc ſinu miſera collegi, ac vacuum pectus frigidis abjectiſque viſceribus rurſus implevi, ſparſos artus amplexibus junxi, membra diducta compoſui.* If any one can imagine, that this great *Oratour* in ſo ſolemn a Declamation would have omitted ſo important an objection as the *unlawfulneſs* and *impiety* of beholding the *entrails* of the *youth*, certainly he thinks too meanly of the judgment of *Quintilian*, and too well of his *own*. It appears out of that *Oration*, that they had ſeldom opportunities of diſſecting *men alive*, and therefore he calls it *rariſſimam occaſionem*. And that they were not ignorant of *Anatomy* and the *inward fabrick of humane bodies*, it is evident further out of that *Oration*, where the Mother ſays the *Phyſicians* muſt needs already have learned that part of their Art. *Sufficit quod aliquando jam facta ex unius hominis inſpectione, ad totius intellectum naturæ medicina profecit. Quid allaturus huic ægroto es, quod non tot ſeculorum, tot languentium experimenta deprehenderint?*

How could they behold the Ludi Circenſes, *the Gladiators fighting in the* Theatre, *and at the* tombs *of the deceaſed; or thoſe* ſad ſpectacles *deſcribed by* Martial? *I profeſs I think it as* groſs a miſtake *to ſay they held it* unlawful to behold the entrails of men, *as to deny the* Augury by beaſts.

As for what Mr. *Glanvill* ſaith about *Democritus*, that *he was fain to excuſe himſelf to Hippocrates for diſſecting of beaſts*; this is as true as all the reſt. Never was there a fitter *ſecond*

for Mr. *Sprat*, then Mr. *Glanvill*. They do not *cite*, but *invent* ſtories, and that with ſo much confidence, that a man muſt be aſſured by *his own reading*, before he can ſuſpect *theirs*. That *Hippocrates* was a diligent *Anatomiſt*, is a thing every one muſt confeſs who either knows the manner of *their education* then, or hath looked into his *Anatomical* books *de locis in homine, de fracturis*, and ſundry other pieces of his. That *he* not only contemplated the *ſeat* and *action* of parts in the *dead*, but *living*, appears by this paſſage, *De Articulis ſect* 43. where he ſpeaks about the ſetting of the *Sphondyles of the back*; *Itaque ſi tale contingat, palam eſt quod neque concutiendo, neque alio quodam modo reponi poſſit, niſi qui diſſecto homine & manu in ventrem injecta, inquiſitionem faciat, ut ex interna parte ad externam manu retrudat: atque hæc in mortuo quidem facere poſſent, in vivo autem non ita.* But I ſhall give an account of the *Anatomy* of *Hippocrates*, in the words of the learned *Riolanus* Anthropograph. l 1. c. 2. *Teſtatur* Galenus Comment. in lib. 3. de artic. *Hippocratem potiſſimum rationi corporum incidendorum ſedulam operam dediſſe, cum Anatomen mirum in modum ad artem medicam conferre ſciret, quod nunc aperte docet cum ſpinæ naturam intelligi voluit, quam Empirici non ſecus atque cæterarum partium contemplationem inutilem eſſe dicunt. Ipſemet Hippocrates lib. 3. de artic. Commentarios de venis & arteriis pollicetur, quos nunquam videre potuit Galenus. Præterea* librum de diſſectione *conſcripſit*, quem imperfectum habemus. *Ipſemet Galenus* libros de *Anatome*, ſecundum *Hippocratis* doctrinam *compoſuerat, quorum deploranda eſt jactura. Hippocrates canes diſſecuit ut pulmones obſervaret.* lib. de corde. *Ibidem monet quod diſſectio accurata hujus partis non eſt opus cujusvis, ſed periti artificis, & appellat iſtud opus Chirurgian. l. 6. Epidem, ſcribit hominem habere cola inteſtina cani ſimilia. Idem lib. de intern. affect. teſtatur ſe in bove, in cane, & ſue, quod impedibus diſſectis tubercula in pulmone aqua referta inveniſſe, unde natus fuerat hydrops thoracis. Idem teſtatur ſe ex hominis oſſibus oſſa deſcripſiſſe: primus ſpinæ admirabilem figuram deſcripſit: primus veſiculas ſeminarias,* earumque *ſitum, omenti uſum, valvulas venarum, ortum nervorum, lienis*

Pag. 800. tom. 2. edit. *Vander Linden.*

actionem,

actionem, uteri conformationem. Atque ut extaret aliquod monumentum æternum & immutabile ſuæ diligentiæ, laboriſque in hoc ſtudio exantlati, ſceletum ære fabricatum Apollini Delphico conſecravit: ut Author eſt Pauſanias lib. 10. And is it credible that ever *Democritus* ſhould be forced to excuſe himſelf to *Hippocrates* for cutting up of *Animals*, as if it were ſo *uncouth* and *ſtrange* to *him?* I cannot anſwer for the Intellectuals of our *Virtuoſo*, but no man of an *higher capacity* can believe it. The pleaſanteſt part of *this Narrative* is, that there appears no ſuch thing *upon record*. Firſt of all the ſtory of *Democritus*, how *Hippocrates* came and found him buſie in *diſſecting of Animals*, is called in queſtion by *Corteſius* in *Miſcellaneis*, as *Riolanus* tells me. And indeed I cannot perſwade my ſelf that thoſe *Letters* in the end of *Hippocrates* works are *genuine*. But to paſs by this exception. All that *Hippocrates* writes in his ſecond Letter to *Damagetus* amounts to this. That at the requeſt of the people of *Abdera*, he came to cure *Democritus* of his ſuppoſed *madneſs*, that being conducted to his houſe, he found him ſitting under a *Plantanus* tree in a garb not much differing from a *madman*, and poſtures that had ſomething of the ſame *humor*: *Ipſe Democritus ſub ampla & humillima plantano ſedebat, in veſte craſſa citra humeros deſinente, ſolus, diſcalceatus, ſuper lapidea ſede, valde pallidus ac macilentus, promiſſa barba —— Ipſe vero cum inculto ornatu, ſuper genibus, librum habebat, ſed & alii quidam ex utraque parte adjacebant. Accumulata etiam erant Animalia multa per totum reſecta. Et ipſe quidem aliquando concitate incumbens ſcribebat, aliquando quieſcebat, diu multumque ſe continens, & in ſeipſo meditans. Deinde non longe poſt, his peractis, exurgens deambulabat, & viſcera animalium inſpiciebat, & depoſitis ipſis digreſſus, rurſus deſidebat.*--- When *Hippocrates* approched near him, he was buſie *writing*, and even then his deportment had ſomething odde and *Enthuſiaſtical* in it. Τὰ μὲν ἐμεσδία, τὰ δ' ἐξεγέλα —— ὅτι δὲ τοῖς γεάφων ἐνθουσιωδῶς, καὶ μεθ' ὁρμῆς. After the firſt *complements* (which are great and *not uſual* in thoſe days) *Hippocrates* demanded of him *what he was writing?* He replied about *madneſs*: *and what*

about that, said the great *Physician*? To which he answers again thus. Τί γὰρ ἔπεν, ἄλλο πλὴν εἴλις τὲ εἴη, ὅκας ἀνθρώποις ἐγγίνεται, καὶ τίνα τρόπον ἀπολοφέοιτο. Τάτε γὰρ ζώα ταῦτα, ὁκόσα, ἔφη, ὁρῇς, τάτε μέντοι γε ἀναλέμνω ἕνεκα, οὐ μισέων θεῶν ἔργα, χολῆς δὲ διζήμενος φύσιν καὶ θέσιν. *Quid enim, inquit, aliud quam quid sit, & quomodo in hominibus generetur, & quomodo alleviatur. Nam animalia hæc, quæ vides, inquit, hujus gratia reseco, non quod odio habeam opera Dei, sed bilis naturam ac sedem quærens.* How much this and the whole passage of that *Enterview* makes for Mr. *Glanvill*'s purpose, I see not. *Hippocrates* doth not blame *him* for *anatomizing of animals*, nor is surprized at the *novelty*, nor troubled at the *impiety* of the action. *Democritus* knowing what apprehension the people had of him, and fearing lest the *garb* and *posture* he was in might confirm to *Hippocrates*, the truth of the *report* tells him how he employed his thoughts, and that the *Animals* that lay there upon the ground, were not slaughtered by *him* in a *frantick rage*, out of *hatred* to the *creatures of God*; but cut up *Anatomically* by him, thereby to discover the *seat* and *nature of the gall*, and the effects it had upon *Maniacks*. Whereupon *Hippocrates* was wonderfully pleased with the testimony he gave of the *soundness of his judgment*, and after some other *prudential discourses*, departed, satisfied about the good condition of his *Patient*. But if *Democritus* were not *out of his Wits*, I believe Mr. *Glanvill was* to alledge such an *impertinent* story. But *idle persons*, that would upon *easie termes* acquire the repute of *Learning*, by *citing quotations*, are often thus imposed upon, and liable to mistakes. And perhaps there may be some person in the world that I know not of, who may have abused our *Virtuoso* in *this case*: but *He* should have minded the *Text* better.

What Pope *Boniface* the Eighth did, I know not. But I am apt to suspect a person that hath told me *so many untruths*. The place in the *Canon-Law*, which I am apt to beleeve Mr. *Glanvill* never saw: It is *lib.* 3. *Extravag. titulo de sepultura*. And *Riolanus*, whom I had rather credit, gives this account of it; *Inter Christianos Papa Bonifacius octavus bar-*

Anthropogr. l. 1. c. 12.

barum

barum & inhumanum judicavit, peregre mortuorum corpora exenterare, carnibusque spoliare, ut ossa lecta & tersa in locum sepulturæ, quem vivi delegerant, commode perferri possent. It seems that *Pope* thought it an *inhumane* and *barbarous* thing not to dissect bodies for *information* sake; but to *embowel them,* and reduce them into *Sceletons,* and so to carry their bones to distant places to be buried according to the desire of the *deceased*. I am apt to think this *Canon* was never applied to *Anatomy,* and perhaps there is nothing of *Excommunication* in it, since *Riolanus* doth not mention it.

As for the gross errours in *Anatomy* which *Galen* is charged with, I know not one that incommodates a man *in point of Practice,* but that the *Method* he took (however founded on false *principles*) was *secure* and *good*. Upon which it happened that *all his followers implicitly* submitted to his *Anatomical* relations without further *Enquiry,* and taught *his Errours* for *truths* : And perhaps a certain vanity seised *Galen* to contradict the famous *Herophilus* out of *dissected Apes,* thereby to raise his own credit. However it was, from *him* arose most of the mistakes in *Anatomy*, that were translated to the *Moors,* and from them to our *Ancestors*. The *Moors* are said by *their Religion,* to forbid the medling with *dead bodies* : Which Assertion, how true it is, I know not, because that *Avicenne* and *Albucasis* commend the study of *Anatomy,* as necessary in a peculiar manner to *Chirurgeons*. They practised sundry *Chirurgical operations* in *Cauteries,* and opening *Arteries,* which seemed to require an *Experimental* skill in *dissections* ; and which were *their own inventions*. In fine, *Averroes* pleads not any scruples of *Religion* for his *ignorance* in *Anatomy,* but laments the *Civil Wars* of the *Moors,* which hindred him from inquiring by *dissection* into those controversies betwixt *Galen* and *Aristotle,* which he had occasion to debate. Yet did *Averroes* at all adventures, assert the credit of *Aristotle* against *Galen,* out of an emulation against *Avicenne* who was a *Galenist*. From these two great men amongst the *Moors,* as the knowledge of *Physick* and *Philosophy,* happened to be imparted to the *barbarous Christians* of the *West,* so was there a feud propagated betwixt the *Philosophers,*

Hinc [*Galeno*] universi fidem dedere, ut nullus repertus sit medicus, qui in *Galeni* Anatomicis voluminibus vel leviſſimum quidem lapsum deprehensum esse, multoque minus deprehendi posse censuerint. *Vesalius* in dedic. lib. de Fabric hum.

ſophers and the *Phyſicians*; and the *controverſies* were the more *intricate*, becauſe the *Sciences* had not been ſo well tranſlated out of *Greek* into *Arabick*, as was requiſite; and they were *worſe* put into *Latine*. After the taking of *Conſtantinople* by the *Turks*, when ſome learned men had fled thence into *Italy*, they began to impart unto the world new books, to acquaint the *Weſt* with the *Greek* tongue, and with the *Greek* Works of *Hippocrates*, *Ariſtotle*, and *Galen*; and thereby multiplied many Controverſies in the *practice* of *Phyſick*, about *Phlebotomy*, and *Purging*, and the like; eſpecially about *bleeding* in a *Pluriſy*, *on which ſide it ſhould be done*. The *contention* was *fierce*, and ſome proofs being fetcht out of *Anatomy*, ſome perſons were excited to enquire into *humane bodies* diſſection, thereby to determine this *controverſy*, and alſo the others betwixt *Ariſtotle*, *Galen*, and others. Amongſt theſe *Veſalius* was (I had almoſt ſaid) the firſt and *principal*, and by his indefatigable pains prevented much the induſtry of *others*. After him *Fallopius* and *Euſtachius* were the moſt remarkable; though many others came in with their *little inventions* to make up the *cry*, and failed not to ſupply the inutility of their diſcoveries with *exceſſive clamor*. What Apologies were made for *Galen* by *Sylvius*, and others, would be tedious to relate; they being ſo *ridiculous*, and repugnant to common ſenſe, that nothing could ſtop the growing glory of *Veſalius* and his *followers*. The iſſue of all was, that as *Hippocrates* loſt no credit by an ingenious confeſſion of his *miſtake* about the *Sutures* in the head of *Autonomus*; ſmall errors being not obſervable in *great Authors*: So *Galen* ſtill retained a great repute in the world, his other Works having advanced him above the effects of *petty* calumnies, or defaults. And the great *Guinterus Andemacus*, a competent Judge of old and new diſcoveries in *Phyſick* and *Anatomy*, gives this cenſure upon thoſe curious Diſquiſitions: *Multa in rerum natura extant, quorum notitia non quidem Medicum aptiorem facit, ſed medicinæ tantum profectum reddit.*

Yet neither are all the exceptions made by Veſalius *againſt* Galen *allowable*. Galenum aliquando in verbis potius quam in ſententiis carpit, aliquando mutilum (quod facere debuerat) minime excuſat, ac ſæpe indignius, quam Anatomicum, Philoſophum, ac Medicum tam inſignem deceret, carpit at accuſat. *Fallopius* obſervat. anatom. p 3.

De vet. & nova med comment. 8. dial. 5 p. 261.

dit, Sic nulli ob accuratam illam, ne dicam curioſam nimis, partium corporis perſcrutationem Medici excellentiores, ſed ob curationes dextre ſentatas abſolutaſque cenſentur. Ideo etiam Hippocrates, Galenus, Eraſiſtratus, *& plures id genus alii, tantum ex rerum natura & corporis humani fabricatione ſcrutari voluerunt, quantum ad medicinam probe exercendam ex uſu eſſe putarunt. Non eadem enim ſemper omnibus ſimilem ob cauſam conducunt.* Sic *Anatome aliter phyſicis inſeruit, qui diſciplinas ipſas propter ſe amant; alterii, qui illam non adeo affectant, ſed nihil temere a natura factum eſſe demonſtrant: aliter his qui argumenta* (ut illeait) *ad actionem quandam vel naturalem vel animalem cognoſcendam, ex partium humani corporis hiſtoria adferre nituntur: aliter medico qui manum aculeis, telonumque cuſpidibus probe exprimendis vel alicui parti apte excidendæ vel ſinubus & fiſtulis & abſceſſibus incidendis adhibiturus eſt; quo Anatomes uſu nihil æque eſt neceſſarium.*

Certainly it had been an action of greater ingenuity in our *Noveliſts* to have acknowledged the many excellent things that are in *Galen,* which are ſo advantageous to *Phyſick,* then to endeavour to render a man *multi ingenii, multaque nihilominus habiturum,* contemptible by the repreſentation of a *few* defects in *him,* relating to things not *much* material to *his profeſſion.* It muſt always be ſaid of *Galen,* that he was the man who by his *dextrous* wit, happy *practice,* and great *eloquence,* as well as *univerſal learning,* did reſtore the glory of the *Hippocratical Phyſick,* which was in a manner extinct *in his days.* He again brought *Anatomy* into requeſt, which had been ſlighted and diſ-uſed ſo long: he himſelf diſſected bodies *privately,* and publickly in the *Temple of Peace*; and amongſt other Diſcoveries of his own, it is obſervable that he found out the uſe of *recurrent nerves,* whoſe influence upon the voice is ſuch, that as they are *preſſed* or *cut into two,* ſo a *Dog* becomes perpetually *mute,* or onely *howls,* never *barks.* Had that curioſity been but the diſcovery of ſome *Noveliſts,* what a noiſe would *they* have made? what *boaſtings* ſhould we have had? But all that is good in *Galen* is paſſed by, and to make way for the glory of our new

Vide *Columbum* Anat. l. 14. & *Veſalium* de fabrica corp. hum. l. [illegible].

In-

Inventors, *Veſalius, Fallopius, Carcanus, Euſtachius, Ingraſſias, Columbus, Arantius, Varolius,* are not ſo much as mentioned by Mr. *Glanvill*; to the end that *we* may (if we will) believe that it is the *genius of this Age* alone, which puts men upon diſcoveries, and that before *them* there were none that had merited *this remark.*

Plus ultra, pag. 13. Riolanus *aſſerts the firſt invention of the* Valves *in the* veins *to* Hippocrates. *Anthropogr. l.5.c.49.*

"I inſtance in the moſt *remarkable* of their diſcoveries "briefly: and thoſe I take notice of are, *The valves of the* "*veins,* diſcovered by *Fabricius ab Aqua pendente*: The valve "at the entrance of the *Gut Colon,* found as is generally "thought by *Bauhinus.*—— I cannot think theſe to be ſo remarkable diſcoveries, but that he might have found out many more, ſince the time of *Veſalius,* I ſhall name one wo gave a great light to the *Circulation of bloud,* and that is the diſcovery which *Realdus Columbus* made, that the *blood* did paſs through the *Lungs* out of the *right* ventricle into the *left,* and ſo into the *Aorta,* and all the body. As for the *valves in the veins,* I believe there are *few* that think that *Fabricius ab Aquapendente,* was the firſt diſcoverer of *them*: for they were ſhewed to *Fabricius* by father *Paul,* that famous *Venetian* Monk, as appears in his *life* written by *Fulgentio*, and extant in *Engliſh.* Neither indeed was Father *Paul* the firſt Inventour of them, for they are deſcribed before by *Jacobus Sylvius,* Profeſſor of Phyſick at *Paris,* as *Riolanus,* and *Slegelius,* and *Bartholinns* do inform the world. And as to the *valve* in the beginning of the *Colon*-gut (if there be ſuch a one, and that it be not rather a protuberant *circle,* ariſing from the joyning of the *Ileon* and *Colon,* as *Pavius, Falcoburgius,* and *Riolanus* hold) whatſoever it be, it was diſcovered by *Varolius,* and called the *Operculum Ilei,* before that ever *Bauhinus* was born, as *Riolanus* doth demonſtrate: there are *two others* that may as juſtly pretend to *it,* to better merit the credit then *Bauhinus,* and thoſe are *Solomon Albertus,* whom *Bartholin* inclines unto: and *Joannes Poſthius* of *Montpelier,* whom *Riolanus* alſo favours.

Riolanus Anthropogr. l.5. c.49. *Marquard. Slegel.* de circul. ſangu. l.2. p.7. *Bartholin.* in libello de venis c.2. *Varolius* Anat. l.2.c.3 *Riolan.* Anthropogr. l.2.c.14. *Bartholin.* Anat. ref. l.1.c. 11.

"The *Sinus of the veins,* and their uſe found out by Dr. *Wil-* "*lis*—— I wonder Mr. *Glanvill* ſhould not acquaint us with thoſe particular *Sinus* which Dr. *Willis* ſhould finde out; for ſince

Plus ultra, pag. 14.

ſince in common diſcourſe, when we ſpeak undeterminately of the *Sinus*, we underſtand thoſe of the *brain*, it did become *him* to tell us which others he meant: leſt a man that knew *his skill*, ſhould apprehend him ſo ignorant as to think that Dr. *Willis* had newly found out thoſe *Sinus*, one whereof hath for above *two thouſand years* born the name of *Herophilus*, and was called *Torcular Herophili*, in Greek Ληνός. But I ſhall be ſo *favourable* as to think that theſe are not the *Sinus* he meant, Dr. *Willis* having tried nothing more in proſecution of them, then to purſue the *Circulation of the blood* there by the injecting of *Inkiſh* liquor, whereas *Wepferus* uſed a *tincture of Saffron*; and *Bartholin* evidenced the *ſame thing* by a *pair of bellows*, or *tube* and *winde* inſufflated. I do beleeve that *He*, or *they that ſuggeſted this to him*, did mean the *Sinus* or *venæ vertebrales*, which are deſcribed *exactly* in the Doctors *Book*, in the *thirteenth Table*. But I muſt tell him, that whatſoever there is in that Piece, which is *Anatomical*, the glory thereof belongs to Dr. *Lower*, whoſe *indefatigable induſtry* produced that *elaborate* Treatiſe; and any man that knows the *great practice* of that other *Doctor*, will grant, that although *he* could not want *abilities*, yet he wanted *leiſure* to attend to ſuch *painful* and *tedeous inquiries*. Dr. *Willis* indeed *candidly* doth relinquiſh this *honour* to Dr. *Lower*, and *his pains* deſerved *your commendation* (Mr. *Glanvill*) if that be of any value, ſo much more then *thoſe other inventions* that are celebrated by the *Virtuoſi*, by how much the ſubject was more *minute* and *ſubtile* which he was to *trace*. All that Dr. *Willis* contributed, that I hear, was the *diſcourſes* and *conjectures* upon the *Anatomical deductions* of Dr. *Lower*, which as *ingenuous* as they are, I am ſure neither *are*, nor ever *will paſs* all for *inventions*. But in the caſe I now mention, I am confident that Dr. *Lower* is ſo ingenuous, as to acknowledge that what *He* exhibits there, is taken out of the *Cuts* of *Varolius*, as far as where *they* empty themſelves into the *ſubclavian veins*: but I think that as to the *Synus*, or *veins*, and *arteries* all along the *Spine*, as there is not any *Cut* of *them* extant *before* that I hear of, ſo I allow them to paſs as *his invention*: but the accurateneſs of his *Neurology* equals ro the beſt Inventors.

Dr. *Willis* de cerebro c 6. p. 82, 83.

Jo. Jac. Wepferus Apoplex. p 116. *Bartholin.* Anat. l. 3, c. 7.

But if Mr. *Glanvill* injur'd Dr. *Lower* in attributing what he invented unto Dr. *Willis*, he will not conceal *his own* diſcoveries, you ſhall ſee what a *Divine* can do in *Phyſick*. 'St. *St*"! I adde the *origination of the Nerves*, which were of old ſuppoſed to ariſe out of the ſubſtance of the *brain*, but are found by late *Anatomiſts* to proceed from the *medulla oblongata*. This is ſuch an *Addition* as becometh our *Novelliſts*, moſt that they pretend unto being no more then Mr. *Glanvill* here boaſts of; and which is ſo pitiful an acceſſional in *Anatomy*, that none ever bragged of it, or upbraided the *Ancients* about it, that I remember, except *Bartholin* may be ſaid to do it. As to the late *Anatomiſts*, unto whom he aſcribes this *invention*, I would he had told *their names*. The difference betwixt the *cerebrum*, *cerebellum*, and *medulla oblongata*, is a modern (but not very *late*) diſtinction. Some have made the *medulla oblongata* and the *ſpinal marrow* to be but productions of the *brain* and *cerebellum*, from whence it raiſeth it ſelf by four *foundations* or *roots*: the diſcrepancy betwixt *that* and the *other* parts whence it is *originated*, not being ſuch as to juſtifie any *great* conteſt about it: ſince it is the uſual courſe of *Nature* in its progreſs from the union of *two different bodies*, to produce an *intermediate ſubſtance*, participating of the nature of both. *Spinalis medulla ortus principium rectius cerebro atque cerebello acceptum fertur, unde non immerito caudex, ſive proceſſus, ſive ſoboles cerebri appellatur: nam vix in ullo, niſi in duritie (eſt enim cerebro aliquanto ſolidior & firmior) videtur a cerebro differre.* Some have made the *brain* & *cerebellum* to be productions of the *ſpinal marrow*, which enlargeth it ſelf within the *skull*, and generateth thoſe two *Apophyſes* called the *cerebrum* & *cerebellum*. In fine, it doth not appear that the *Ancients* miſtook much the place of the *origination of nerves*, if you reckon amongſt them *Veſalius* and *Fallopius*: but *they* ſaid they roſe all from the *brain*, underſtanding by that word all that which is included within the *skull*, and termed that to be the *ſpinal marrow*; which was without the *skull*, and whence thoſe other *paria nervorum*

Vol. Coiter. obſerv. anatom miſcel. Ex ſubſtantia *cerebri* & *cerebelli* quatuor radicibus oritur primum truncus inſignis, *Medulla ſpinalis* appellatus, ex quo multi emergunt ſurculi, nomine *nervorum* inſigniti. *Varolius* Anatom l. 1. c. 13. p. 12.

rum ſeem to riſe, which *Anatomiſts* deſcribe. And this *ſubtilty* of Mr. *Glanvill* is ſo little regarded by late *Anatomiſts*, that *Mœbius* (a man of as great note as moſt are) ſlights *it* by the example of *Hofman*, whoſe ſenſe I ſhall here report: *Monendi ſunt adoleſcentiores, ne forte morentur illos qui neglecta veteri diſtinctione dicunt, Omnes nervi ſunt a medulla, ſed alii ex illa, antequam cranio excidat, alii ex eadem, cum jam in ſpinam delapſa eſt, & Spinalis dicitur. Quid enim hoc aliud eſt, quam fruſtranea nominum novatio? Cum dico me de nervis ex cerebro ortis acturum, intelligo totum id quod cranio continetur.* There is another *Origination* of the *nerves*, which is as ancient as *Ariſtotle*, and which *Hofman* and *Vander Linden* aſſert, wherby they are deduced *immediately* and *formally* from the *brain*, but *immediately* and *materially* from the *heart*; for ſo much as they hold each *nerve* to be an *Artery* veſted with the *membranes* of the *brain*, and ſo iſſuing to ſeveral parts. This opinion is very agreeable to the *obſervations* that occurre in the *practice of Phyſick*, and *their* arguments ſeem to me ſo *plauſible*, that I am ſo averſe with Mr. *Glanvill* to proclaim a *new origination of the nerves*, that I much doubt whether the *followers of Galen* were not deceived, and the *Peripateticks* in the right. See *Vander Linden* Diſp. 38. *de vaſis & nervis*, and *Hofman de partib. ſimilar. in theſ. de orig. nerv. ſec. Ariſtot.*

Mœbius fundamem med. c. de uſu nervor p. 606. *Caſpar Hofman.* Inſtit. med. l. 2. c. 65. ſect. 1.

So Dr. Charlton *in his Diſcourſe to the* Royal Society *concerning the* Brain, *takes the liberty to underſtand by the* Cerebrum *as well as others*, totum illud corpus quod Calvariæ concavo continetur (*pag.* 67. de Propr. cerebri humani) *though afterwards, when he comes to ſpeak more accurately, he treats of the* Medulla oblongata *thus*: Cerebro proxime ſubjicitur anima nervorum ad ſenſus ſpectantium mater, & *funis argentei* (ſicut *Sapiens* in *Eccleſiaſte* eleganti ſed obſcura Allegoria vocat *Medullam ſpinalem*) principium *Medulla* ſcilicet *intra cranium oblongata*. Behold the addition of Mr. *Glanvill!*

It is clear now that Mr. *Glanvils* new addition amounts onely to this, that the *Ancients* did ſome of them hold that the *nerves* had their original from the *brain*; others deduced them from the *heart*. Some (perhaps before *Varolius*) did ſubdivide the *brain* into ſeveral parts, and ſaid that the *nerves* had their origination from the *medulla oblongata*, and not from the *cerebrum* and *cerebellum*. This nicety Dr. *Willis* makes ſome uſe of, but ſince *he* explicates no-

Vide *Varolium* l. 1. c. 3.

If Varolius *found it out, as I believe he did, by a peculiar way of diſſecting the head, what is it that Mr* Granvill *then* ADDS? *I am ſure that* Fracaſſatus *ſaith, Varolius* primus principium *Spinalis medullæ* vel intra *cranium* ſoboleſcere in nervos, quorum origo olim à cerebro petebatur, docuit.

thing of the *brain* with a *mechanical accurateneſs*; I ſhall only ſubjoyn, that whoſoever ſhall *view* or *eat* that which they call *Medulla oblongata & ſpinalis*, and compare it with the *marrow* that is in the *bones* otherwiſe, *he* will think it a leſs *impropriety of ſpeech*, to ſay the *Medulla oblongata* is a part of the *brain*, then to term it a *Medullary ſubſtance*.

" *And though the* Succus Nutritius *be not yet fully agreed* " *upon by* Phyſicians, *yet it hath ſo much to ſay for it ſelf, that* " *it may not unreaſonably be mentioned amongſt the* new " Inventions—— It's ſtrange Mr. *Glanvill* ſhould entitle *this opinion* about the *Succus Nutritius* to ſo great a degree of *probability*, as he doth. *Phyſicians* are ſo far from being *fully agreed* upon it, that, excepting Dr. *Gliſſon*, Dr. *Charleton*, and perhaps *one* or *two* more, the reſt do generally reject it. Dr. *Highmore*, Dr. *Willis*, and *Bartholine* have written againſt *it*; and ſo hath *Deuſingius* writ a particular diſcourſe againſt it. Nor do I doubt, but whoſoever peruſeth thoſe *Authors*, which I refer unto, will be ſo far from imagining it reaſonable to aſcribe the *Succus Nutritius* to the number of *modern Inventions*, that *he* will term it at beſt but an *ingenious Paradox*, which when the firſt *ſurpriſe* is over, vaniſheth with the appearance of being *ridiculous*. How much doth our *Virtuoſo*, and *Bartholine* differ? *Prodeat Herophilus, ex antro educatur Democritus, advocentur proſectores cujuſcunque ſortis & ætatis, ſi in diſſectis corporum nervis ullum invenerint liquorem nutritioni opportunum, nolim inter eos locum mereri.*

Highmore de affect. hypochondr. c. 4. *Willis* in Anatome cerebri c. 20. *Bartholin* ſpicileg. 1. c. 3.

Bartholin. ſpicileg. 1. de vaſis lymphat p. 23.

" But of all *Modern Diſcoveries, Wit* and *Induſtry* have " made in the *Oeconomy* of humane nature, the nobleſt is that " of the *Circulation of the blood*, which *was* the invention of " our deſervedly famous *Harvey*. 'Tis true, the *envy* of *ma-* " *licious* Contemporaries would have robb'd him of the *Glory* " of this *Diſcovery*, and pretend it was known to *Hippocrates*, " *Plato, Ariſtotle*, and others among the *Ancients*; but who- " ever conſiders the expreſſions of thoſe *Authors*, which are " ſaid to reſpect the *Circulation*, who finde that thoſe who " form the *inference*, do it by a *faculty* that makes all kind " of *Compoſitions* and *Deductions*, and the ſame that aſſiſts

Plus ultra, pag. 15.

" the

"the *Enthuſiaſts* of our days, to ſee ſo clearly all our altera-
"tions of *State* and *Religion*, to the *minuteſt particulars* in
"the *Revelation* of Saint *John*. And I think it may be as
"well concluded from the firſt chapter of *Geneſis*, as from
"the *remains* of thoſe *Ancients*, who if *they* had known
"this *great* and *general Theory*, how chance they ſpeak no
"more of a thing, which no doubt they had frequent oc-
"caſions to mention? How came it to be loſt without
"Memory amongſt their followers, who were ſuch *ſu-*
"*perſtitious Porers* upon their Writings? How chance
"it was not ſhewn to be lodged in *thoſe Authors* before the
"days of Dr. *Harvey*, when *Envy* hed *impregnated* and de-
"termined the *Imaginations* of thoſe who were not wil-
"ling any thing ſhould be found anew, of which themſelves
"were not the *Inventours*? But 'tis not only the *re-*
"*moteſt* Ancients, whom time hath *conſecrated*, and *di-*
"*ſtance* made *venerable*, whoſe *Aſhes* thoſe *fond men* would
"honour with *this diſcovery*; but even much *later* Au-
"thors have had the glory faſtned upon them. For the
"Invention is by ſome aſcribed to *Paulus Venetus*; by o-
"thers to *Proſper Alpinus*; and a third ſort give it to
"*Andræas Cæſalpinus*. For *theſe*, though either of them
"ſhould be acknowledged to be the Author, it will make
"as much for the deſign of my diſcourſe, as if *Harvey*
"had the credit: and therefore here I am no otherwiſe
"concerned, but to have *juſtice* for that excellent man:
"and the World hath now done *right* to his *Memory*,
"*Death* having overcome that *Envy* which *Dogs living*
"*vertue* to the *Grave*; and his *Name* reſts quietly in
"the Armes of *Glory*, while the *Pretenſions* of his *Rivals*
"are creeping into *darkneſs* and *oblivion*.

Whether thoſe that have gone about to deprive Dr. *Harvey* have been incited by *Envy* and *Malice*, it is hard for any *conſiderate* man to judge; ſince thoſe which firſt propoſed the *doubt* about the *Author*, were great friends to the *Theoreme*; ſuch as *Walæus*, who firſt mentioned it; *Riolanus*,

Riolanus, Nardius, Fracaſſarus, and *Joannes Antonides Vander Linden*: All of them pay a great *reſpect* to Dr. *Harvey*'s Performances; All of them concur with him *generally* in *his Aſſertions*, ſaving that *Riolanus* made ſome variation *therein*, and perhaps his *paſſion* might blinde his *candour*; though *I do not think ſo*, becauſe *I* finde him zealouſly vindicating of Dr. *Harvey* from thoſe imputations by which *Walæus* endeavoured to transfer the credit of the *invention* upon Father *Paul*.

Another thing *I* muſt take notice of is, that Mr. *Glanvill* ſpeaks very peremptorily about a thing he hath not enquired into, for it is evident that he never read the paſſages out of the *Ancients*, which are cited by *Walæus* and *Riolanus*, to to ſhew they were not altogether ignorant of that *motion of the bloud* which is called *Circulation*. He thinks *it may be as well concluded from the firſt chapter of* Geneſis, *as from the remains of the Ancients*. And why ſo? Is there any thing mentioned in the firſt chapter of *Geneſis*, that ſounds like the *Circulation of the blood*, or any words that can be applied unto this *late diſcovery*? not one. But any man that underſtands Greek, muſt confeſs that the words ἄμπωλις, πλημμυρὶς, and περίοδος in *Hippocrates* (whatever he meant by them) do moſt *emphatically* ſignifie the *Circulation of the blood*, as it is now propoſed. If *I* merit not to be believed *herein*, take the judgement of *Julius Cæſar Scaliger* upon *Ariſtotle* de inſomn. xiij. 1444. Ποταμοὶ ὃ μὴ καλὰ τέρον γινόμενοι, αἱμαίου περίοδον σημαίνουσι. *I* ſhall not from this place deduce the myſtery of the *Circulation of the blood*, by ſaying that *rivers* circulate *under ground* thorough that *ſandy earth*, which thoſe that dig in Wells, when they come unto, they can deſcend no further: (which *Helmont* in the *Brabant* Dialect calls *Quellem*, other *Dutch-men* name *Well-ground* and *Well-ſand*, and after return unto the *Sea* again by *open Channels*: But whatever the intent of the *Philoſopher* was, that αἱμαίου περίοδου, properly imports *ſuch a thing*, and that we have the *name* given it by *Ariſtotle*, this *Scaliger* confeſſeth, *Ejus ad apoteleſma* xxxi. *hæc ſunt verba* Αἱματος περιόδον, *motum*; *ut infebribus acceſſionem*. Circuitum *Calvus*

Calvus cum dicit, fideliter, *non plene explicat. Neque enim. circumducitur ſanguis*, ut περιόδῳ *impleat ſignificationem Nam in febribus idcirco* dicitur περιόδῳ, *quia revertitur paroxyſmus: quaſi circumductus ob diem parum & vacuum a morbo.* From which it is evident, that if *Scaliger* had known that the blood had *circulated*, he would have granted it to have been *properly* expreſſed here in the *Text*: which is more then *He* would ſay of any *Apocalyptical* diſcoveries, or *deductions* of that opinion out of the firſt Chapter of *Geneſis*. And if the word περιόδῳ be ſo *ſignificant*, it is hard to deny that *Hippocrates* did not ſet down the thing it ſelf in this paſſage, Αἱ φλέβες διὰ τῶ σώματος κεχυμέναι, πνεῦμα, καὶ ῥεῦμα, καὶ κίνησιν παρέχονται· ἀπὸ μιῆς πολλαὶ διαβλαστάνουσι. Καὶ αὕτη μὲν ἡ μία ὅθεν ἤρξαται, καὶ ἡ τελευτήκεν, οὐκ οἶδα. Κύκλω γὰρ γενομένω, ἀρχὴ οὐχ' εὑρέθη. *Venæ per corpus fuſæ ſpiritum, & fluxum, & motum præſtant. Ab una multæ propagantur: ſed illa una unde incipiat, aut ubi deſinat, non ſcio.* Circulo *enim* ducto, *principium non invenitur.* And in that other; Ἐς τεῖχας τροφὴ, καὶ ἐς ὄνυχας καὶ τὴν ἐσχάτην ἐπιφανείην ἔνδοθεν ἀφικνέεσθαι. Ἔξωθεν τροφὴ οὐκ ἐς ἐσχάτης ἐπιφανείης· ἐνδοτάτω ἀφικνέεσθαι. Ξύῤῥοια μία, ξύμπνοια μία, ξυμπαθέα πάντα. Καὶ μὲν οὖν ἀλομελίην πάντα· καὶ κατὰ μέρος ὅ. τι ἂν ἑκάστῳ μέρει μέρεα πρὸς τὸ ἔργον. Ἀρχὴ μεγάλη εἰς ἔσχατον μέρος ἀφικνέεσθαι. Ἐξ ἐσχάτου μέρεος εἰς ἀρχὴν μεγάλην ἀφικνέεσθαι. *In pilos alimentum* [id eſt, ſanguis nutriens] *& in ungues, atque extremam ſuperficiem intus advenit: færis alimentum ab extrema ſuperficie intime revertitur. Corrivatio una, conſpiratio una, conſentientia omnia. Certe quod ad communem naturam omnia: in quavis parte partes ad opus. Principium magnum* [id eſt Cor, per tranſmiſſos ſpiritus & ſanguinem] *ad extremam partem pervenit: ab extrema parte ad principium magnum revertitur.* There are more paſſages in the ſame *Authour* which ſeem to *import* the ſame thing, though his uſual *brevity* and *obſcurity* is ſuch, that had not *Harvey* and others dilucidated the point, we had never, I believe, fixed *this explication* upon him, which amounts to no more then a *new gloſs upon an old Text*: which yet is ſufficient to check the largeneſs of Mr. *Glanvills* aſſertion. The περίωσις of *Plato*, and his making the *Heart* to be the *original*

Hippocratès de off. nat. t. 17.

Ex lib. de alim. t. 412.

of

Plato in Timæo. *of the veins,* καὶ τῶ περιφερομένω καλὰ πάντα τὰ μέλη σφοδρῶς αἵματος; theſe are ſomething more then is to be found in the firſt of *Geneſis*. And that paſſage of *Ariſtotle* de Gen. Anim. l.4. c.ult. is ſo unlike any thing of *Moſes's*, and ſo like to the doctrine of *Harvey*, that any man muſt blame Mr. *Glanvill*, for raſhneſs of what he ſays. The words are thus ſet down by *Riolanus*, and I have not the *Original* by me to conſult: *Cum cœleſtia corpora circulariter moveantur, inferiora corpora motum illum imitari debent, cumque Oceanus fluxu & refluxu moveatur ab influxu Lunari, ſimiliter humores talem motum habere neceſſum eſt.* Which words ſeem clear enough, ſo as to juſtifie the *Epiphonema* of my *Author*, in oppoſition to our *Virtuoſo*. *Quid iſta ſignificant niſi ſanguinis Circulationem.* He that would be informed *more fully* about the judgement of the *Ancients*, whether there be any thing in them that diſcovers the *Circulation of the blood*, to have been known unto *them*; or that they were not *totally ignorant*, and without *any apprehenſions* of it: let him reade the firſt letter of *Walæus*, and the ſeveral Pieces of *Joannes Riolanus* about the *Circulation of the blood*, and the diſputations of *Vander Linden* about the *Circulation of the blood*, in which *he* vindicates it in a *prolixe diſcourſ* unto *Hippocrates*. I wil not trouble my *ſelf* to tranſcribe *them*: It is evident that *all men* do give unto *Harvey* the credit of having ſo explicated it, and *Anatomically* proved it, that he may as well be termed the *Author* of it, as *Epicurus* and others the *Authors* of that *Philoſophy* which they derived from *Pythogoras, Democritus, Leucippus*, and *Ocellus Lucanus*. Nor hath *Harvey* any other *Plea* and *Right* to the *Invention*, then that *he* did more *fully* and *perſpicuouſly* declare *it*, and in the moſt *judicious* and *ſolid* manner aſſert what others had but *hinted* at, or *faintly* inſiſted on.

Nor is Mr. *Glanvill* any better acquainted with the notions of the *Modern Writers*, then he is with thoſe of the *Ancients*. He ſaith, that *ſome have aſcribed the Circulation of the blood to Paulus Venetus*. I muſt inform the Reader (who may eaſily miſtake, if he be one of the ordinary *Comical Wits*) that it is not to be aſcribed to *Paulus Venetus*, the great *Traveller*,

veller, who is generally understood, when *that name* is mentioned; none can say that *he* brought it from the Kingdom of *Cathay*. But *Pater Paulus Sarpa* (or *Serpa*) or Father *Paul*, the famous *Venetian* Monk, of the order of the *Servi*; who signatised himself during the time that *Venice* was interdicted. He was a Student at *Padoa* at the same time that *Harvey* was there, and discovered to *Aqua pendens* the *valves in the veins*, which discovery that great *Anatomist* appropriated to himself; and so *Harvey* was thought to have abused the same *Father*. But since *Fulgentio* in the life of *Padre Paolo* doth not challenge *Harvey* for this Cheat, as he doth *Fabricius* for that other; and since *Marquardus Slegelius* could not hear of any such thing upon a strict Enquiry at *Venice* and *Padua*, I know not any since *Walæus* and *Franciscus Ulmus*, that have ascribed the invention to *Paulus Venetus Servita*.

Vide *Slegel.* de motu Sanguin c. 2. & *Riolan.* in not. ad ep. *Walæi.*

Neither did I ever reade of any man that attributed it to *Prosper Alpinus*: nor is it credible that any *ever* did so. For that great *Physician* established his *glory* by being an excellent *Practitioner*, and not by any *Anatomical* curiosities, which he rather *contemned*, then pursued: and till I know what Author Mr. *Glanvill* follows, I believe the mentioning of him was occasioned by that way of discoutse which is common to the *Wits* of this Age, to *blunder out any thing*: and by *laughing* at *improbabilities* (of their *own* suggestion) to explode *substantial truths*, or represent them as *forgeries*. But if any did deceive the world in attributing the *Circulation of the blood* to *Padre Paolo* and *Prosper Alpinus*, it doth not follow but that *Andreas Cæsalpinus* was the *first Inventor* of *it*, and proposed it to the world in his *Medical* and *Peripatetical Questions*, though not in any Set Discourse, but as it *casually* falls into the discussion of other *Problems*: Whereupon it was *little regarded*, and not enquired after; the *book* being also *scarce*, and *he* being of that *faction* of *Physicians* which adheres to *Aristotle* against *Galen*, whence it hapned that few read his *Paradoxes*, and one of the bravest men of the latter Age hath been almost buried in oblivion. However, an ingenious *Florentine*, call'd *Joannes Nardius*,

hath aſſerted the repute of *Andræas Cæſalpinus*, for precedency to *Harvey* in the *Diſcovery*; nor doth the ſame *Author* doubt, but that *Eraſiſtratus* was of the ſame opinion: but he ſaith of *Cæſalpinus* this: *Fœlix cui contigit poſt mortem nanciſci clariſſimum Patronum Guglielmum Harveium Regium Medicum, nobiſque per charum, qui abortivam illam opinionem excoluit adeo, ut nihil cultius noſtro ſeculo, nilque mirabilius occurrerit curioſis & amænarum literarum amatoribus.* To decide this *queſtion*, and to put an *end* to thoſe *diſputes* which trouble ſome of our *Virtuoſi* ſo much, by reaſon of that *little* converſe they have with *Books*, I ſhall draw out the opinion of *Cæſalpinus*, as he expreſſeth himſelf in his *Diſputations*.

Andræas Cæſalpinus Qu. peripatet. l. 5. qu. 3.

As a great abettour of *Ariſtotle*, he avows that the *Heart* is the principal part in man, and the original of the *veins*, *arteries*, and *nerves*; which is the opinion of *Hofman*, *Van der Linden*, and other Ariſtotelian Phyſicians.

Ib. qu 4.

He deſcribes the *Fabrick* of the *Heart* as exactly as any of the *Circulators* in reference to the *Valves*, ſo much *talked* of; but he declares not their ſhape: *Vaſorum in Cor deſinentium quædam intromittunt contentam in ipſis ſubſtantiam, ut vena Cavæ in dextro ventriculo, & arteria venalis in ſiniſtro: quadam educunt, ut arteria aorta in ſiniſtro ventriculo, & venæ arterialis pulmonem nutriens in dextro: omnibus autem membranule ſunt appoſitæ & officio delegatæ, ut oſcula intromittentia non educant, & educentia non intromittant.*

And for the account of the *Vena arterioſa*, and *Arteria venoſa* in the Lungs, *Harvey* is not more perſpicuous, then he is afterwards, where he makes the one to be an *Artery*, the other a *veine*, viz. *Putaverunt autem Medici uſum hunc non videntes commutatæ fuiſſe vaſa in pulmone, ut Arteria quidem ſimilis eſſet venæ, vena autem ſimilis Arteriæ: appellantes venas vaſa omnia quæ in dextrum ventriculum deſinunt, Arterias autem, quæ in ſiniſtrum: figmenta multa & abſurditates excogitantes ut uſum invenirent. Pulſat igitur in pulmone vas dextri ventriculi, hæc enim e corde recipit, ut Arteria magna, & ſimiliter fabricatum eſt ejus corpus. Vas autem ſiniſtri ventri-*

culi

culi non pulsat, quia introducit tantum, & ejus corpus simile est reliquis venis.

He holds that the *motion* of the *Heart* and *Arteries* depends not upon any *pelsifick Faculty*, but that it ariseth from the ὀγχωσις, ebullition, or *effervescency* of the blood in the Ventricles; and that the *Heart* and *Arteries* are *dilated* at the same time, the blood dilating the *Heart*, and issuing out thorough the *valves* of the *Aorta* and *Pulmonique Artery* at the same instant, which is pure *Cartesianism*.

He holds that the *Blood* comes up from the *veins* to the *Heart*, and there acquires the last *Perfection*, and becomes vital and *spirituous*: in the mention of the *Arterious Blood*, he useth indifferently the termes of *Blood*, *spirit*, and *natural heat*, which I desire may be observed, lest the *proofs* seem not *full enough*, and he be construed to speak of nothing but *spirits* and *natural heat* in the *Arteries*. He saith, that this *Blood* having acquired its *Perfection* in its passage through *both the ventricles*, is distributed through all the parts of the *body*, for its nutriment by the *Arteries*, in which *Arteries* there is such a constant quantity of *Blood*, that the effervency of that in the *Heart* impells the whole continuation of the *Arteries*, so that they beat *all at once*. *Cum enim pulsatio Cordis & Arteriarum sit accidens quoddam quod ex necessitate insequitur humoris in corde effervescentiam, qua sanguinis generatio perficitur, ut in cæteris quæ igne elixantur, accidit. lib. de vita & mort. c. 2. intumescente corde necesse est simul omnes Arterias dilatari, in quas derivatur fervor: non enim repleri potest una pars, quin totum fiat majus: ubi non omni ex parte vasa quæ continua sunt fuerint exinanita. Nam nullo intus existente corpore, non contingit simul repleri principium & extrema, cum motus non fiat in instanti: existente autem per totos canales aliquo spiritu, simul ac in principio alius fuerit genitus, necesse est totum simul dilatari, unum enim sit spiritus accedens cum toto. Cum ergo totum reddatur majus simul ac accesserit pars, non potest una pars dilatari, quin eodem tempore dilatetur totum.*

Mark this, where he makes the *Heart* and *Arteries* to be one continued receptacle of *perfect blood*: by which you must explain what he says in some places, as if only *spirits* or *natural heat* went into the *Arteries* or returned by the *veins*.

Est autem veluti totum quoddam Arteriæ omnes cum corde; Continuum enim est vas sanguinis perfecti. Spiritu autem efflante inhabitum corporis, & distributo particulis sanguine, necesse est tumorem vasorum desidere, quæ est pulsus contractio. Continue autem hoc fit, quia continua est partium nutritio, & continua sanguinis generatio in corde. Elevatio igitur Spiritus a calore fit, non tamen temere, sed alicujus gratia. Nam sine hujusmodi amplificatione non fieret distributio alimenti in omnes partes.

He plants a kind of *Flammula cordis*, or fire in the *heart*, which causeth the *ebullition*, and imprints a *spirituousness in the blood* that issueth out into the *Arteries*. *Hujusmodi locus Cor est in quo secundum Naturam elementum præparatum ardere possit, & fieri spiritus: venæ alimentum suppeditant, Arteriæ flammæ spiritum recipiunt.*

He saith, that the *Blood* moves towards the *Heart*, as the *Oyle* to the flame of the burning *Lamp*, and that the *Valves* as the orifice of the *Vena Cava* which immit the blood, are placed there to moderate the *source of the blood*, lest it should fall in *too fast*, & extinguish the *vital fire*: and that the *valves* at the entrance of the *Aorta* do flie open upon the *effervescency* of the *blood*, by the pressure of it every way, to get more room: it finding no *out-let* but by those yielding *valves*, which were so placed, lest upon any *accident*, or violent *passion*, the *arterious blood* should regurgitate into the *Heart*, *Motus fit ex venis in Cor caliditate alimentum trahente, ex corde autem in arterias, quia hac solum patet iter propter membranarum positionem, positæ autem sunt hoc modo membranæ, ne unquam contingeret contrarium motum fieri, quod accidere posset in vehementibus animi perturbationibus, aut aliis causis, a quibus sanguinis retractio fit ad Cor: Obsistunt enim huic motui membranæ. Nam si hoc modo condite non essent, ignis cordis vel levi causa extingueretur. Si enim motus fieret contrarius simile esset, ac si flamma compingeretur deorsum ad alimentum, quod cum minime sit præparatum, aut copiosius quam oportet, ignem suffocat. Oportet enim alimentum præparari, & paulatim dispensari ad locum flammæ.*

He saith that this *arterious blood*, or *spirit*, is distributed into

into all parts of the *body*, with great *celerity*, and that it is that which *nouriſheth the parts*: and that upon its diffuſion into the *habit of the body*, the *ſpirits* are very much *exhauſted*, and the *corpulent* part of the *aliment* doth remain, being coagulated partly by *heat*, and partly by *cold*.

He ſaith, that the variety of the *pulſe*, as to *ſtrength* or *debility*, *celerity* and *ſlowneſs*, depends upon the nature of the *vital fire*, the nature of the *aliment* with which it is fed, and ſometimes upon the particular *Fabrick*, or conformation of the *Heart*, in which that *Fire* is ſeated.

He placeth *Anaſtomoſes* betwixt the *veins* and arteries every where in the body. *Oſculorum communio eſt non ſolum in corde, ſed etiam per totum venerum & arteriarum ductum,*

He ſaith that the blood is never *extravaſated*, but where it is aggregated to any part by way of *nouriſhment*, or elſe it *putrifies*: he doth not underſtand how it ſhould not *coagulate* if once *extravaſated*; nor can he comprehend how it ſhould be reaſſumed into the *veins* in ſuch a caſe. *Venam continuam eſſe oportet, uſque ad cordis ventriculos, ut inde omnis virtus deſcendat: nec ullibi contingit disjunctam eſſe; ſanguis enim calore cordis deſtitutus concreſcit, & tandem putreſcit.*

He makes the *Blood* to paſs betwixt the *right* and *left* ventricle of the *Heart*; partly by the *Lungs*, and partly by the *Septum Cordis*. *Pulchre igitur condita ſunt omnia. Cum enim fervere oporteret in corde ſanguinem, ut fieret alimenti perfectio: primo quidem in dextro ventriculo, in quo craſſior adhuc continetur ſanguis, deinde autem in ſiniſtro, ubi ſincerior ſanguis eſt: partim per medium ſeptum, partim per medios pulmones refrigerationis gratia ex dextro in ſiniſtrum mittitur. Interim autem pulmo abunde nutriri poteſt: totum enim eum ſanguinem abſumere, quem recipit, egreditur fines rationis. Non enim rara eſſet ejus ſubſtantia & levis, ut videtur ſi tantum alimenti, vim in ſuam naturam converteret.* This he thus further explains. *Pulmo per venam arteriis ſimilem ex dextro cordis ventriculo fervidum hauriens ſanguinem, eumque per anaſtomoſin arteriæ venali reddens quæ in ſiniſtrum cordis ventriculum tendit, tranſmiſſo*

missō interim aere frigido per aspera arteriæ cānales, qui juxta arteriam venalem protenduntur, non tamen osculis communicantes, ut putavit Galenus solo tactu temperat. Huic Sanguinis Circulationi ex dextro cordis ventriculo, per pulmones in sinistrum ejusdem ventriculum optime respondent ea quæ ex dissectione apparent. Nam duo sunt vasa in dextrum ventriculum desinentia, duo etiam in sinistrum. Duorum autem unum intromittit tantum, alterum educit, membranis eo ingenio constructis. Vas igitur intromittens, vena est magna quidem in dextro, quæ cava appellatur: parva autem in sinistro, ex pulmone introducens, cujus unica est tūnica, ut cæterarum venarum. Vas autem educens Arteria, est magna quidem in sinistro, quæ Aorta appellatur, parva autem in dextro ad pulmones derivans, cujus similiter duæ sunt tunicæ, ut in cæteris arteriis.

He holds that the *spirituous* or *arterious blood* is cast out, and diffused vigorously into the *habit of the body*, that the *veins* and *arteries* being continuous by *Anastomosis*, it returns to the *Heart* again, vigorating the blood of the *vena porta* and *Cava* as it returns: which is sufficiently intimated in that he deduces all the *vigour* and *vitality* of the *blood* from the *Heart*, and that this vigour or *natural heat* is carried over the body by the *Arteries* alone, and that it is necessary that the whole *venous Systeme*, or contexture of *Arteries* and *veins* be *continuous*, lest the blood in the *veins*, being destitute of the *cordial heat*, should *coagulate* and putrifie. *He* holds that this *motion*, or *Circulation of the blood* is without intermission: and that the swelling of the *veins* upon the *Ligature* is a sufficient proof of it. But *he* holds, that the recourse of the blood by the *veins* is greater in the *sleep*, then when we *awake*; which he proves thus, in that the *veins* are more full and tumid during *sleep*, then *waking*: and the *pulse weaker*, and more *slow*; as any man may observe. From whence *he* concludes, that the *natural heat* (which is the *Arterious blood*, as I observed before, to prevent all possible mistakes) which was otherwise in great part expended upon the *nerves* and *sensories*, doth in *sleep* return: and fill the *veins* more *visibly* (that exhaustion ceasing) then when we are not *asleep*.

His

His opinion will be beſt ſet down in his *own words*; and I think it neceſſary to do it, becauſe *Nardius* hath done it ſo *imperfectly*, that one would attribute as little to his *allegations*, as to thoſe which are cited out of the *Ancients*; and if I had not read *Cæſalpinus* long before, I ſhould have thought the *Florentine* to have intitled *Cæſalpinus* to the opinion out of envy to *Harvey*, or out of a partial deſire to advance the glory of the *Tuſcan* Academy at *Piſa*, when *Cæſalpinus* was Profeſſour. Thus that learned man writ about the year 1590. or a little after.

Andræas Cæſalpinus Queſt. Medic. l. 2. Qu. 17. edit. venetæ ſecunda in 4^to^. A. D. 1593. fol. 234. col. 1.

'Sed illud ſpeculatione dignum videtur, *Propter* 'quod intumeſcunt venæ ultra locum apprehenſum, *non* 'citra: quod experimento ſciunt qui vena ſecant: 'vinculum enim adhibent citra locum *ſectionis*, non 'ultra: quia tument venæ *ultra* vinculum, non *citra*. 'Debuiſſet autem oppoſito modo contingere, ſi *mo*'tus ſanguinis & ſpiritus a viſceribus fit in totum 'corpus: intercepto enim meatu, non ultra datur pro'greſſus: tumor igitur venarum *citra vinculum* de'buiſſet fieri. An ſolvitur dubitatio ex eo quod ſcri'bit *Ariſtoteles*, de Som c. 3. ubi inquit, *Neceſſe enim* 'quod evaporatur aliquouſque impelli: deinde converti '& permutari, ſicut Euripum: calidum enim cujuſque 'animalium ad ſuperiora natum eſt ferri: cum autem 'in ſuperioribus locis fuerit, multum ſimul ite'rum revertitur, ferturque deorſum. Hæc Ariſtoteles.

Pro

'Pro cujus loci explicatione illud ſciendum eſt:
'*Cordis* meatus ita a natura paratos eſſe, ut ex *vena*
'*Cava* intromiſſio fiat in *Cordis* ventriculum *dex-*
'*trum*, unde patet exitus in *pulmonem*: ex pulmone
'præterea alium ingreſſum eſſe in *Cordis ventriculum*
'*ſiniſtrum*, ex quotandem patet exitus in *Arteriam*
'*Aortam*, membranis quibuſdam ad oſtia vaſorum
'appoſitis, ut impediant retroceſſum: Sic enim
'perpetuus quidam motus eſt ex vena cava per *Cor* &
'*pulmones* in *Arteriam Aortam*: ut in *Quæſtionibus*
'*Peripateticis* explicavimus. Cum autem in *vigilia*
'motus caloris nativi fiat extra, ſcilicet ad ſenſoria;
'in *Somno* autem intra, ſcilicet ad *Cor*: putandum
'eſt in vigilia multum ſpiritus & ſanguinis ferri ad ar-
'terias, inde enim in nervos iter eſt. In ſomno au-
'tem *eundem calorem* per *venas* reverti ad *Cor*, non
'per *Arteriam*. Judicio ſunt pulſus, qui expergiſ-
'centibus fiunt magni, vehementes, celeres, & cre-
'bri, cum quadam vibratione: in ſomno autem
'parvi, languidi, tardi & rari notante *Galeno*. 3. *de*
'cauſ. pul. 9,10. Num in Somno *calor nativus* minus
'vergit in *arterias*: in caſdem erumpit *vehementius*
'cum expergiſcuntur. *Venæ* autem contrario ſe
'modo habent: nam in ſomno fiunt tumidiores, in
'vigilia exiliores, ut patet intuenti eas quæ in manu
'ſunt. Tranſit enim in ſomno *calor nativus ex ar-*
'*teriis in venas per oſculorum communionem*, quam *A-*
'*naſtomoſin* vocant, & inde ad *Cor*. *Ut autem ſangui-*
'*nis exundatio ad ſuperiora, & retroceſſus ad inferiora*
'*ad inſtar Euripi manifeſta eſt in ſomno & vigilia, ſic*

'*non*

non obſcurus eſt hujuſmodi motus in quacunque parte corporis vinculum adhibeatur, aut alia ratione occludantur venæ. Cum enim tollitur permeatio, intumeſcunt rivuli qua parte fluere ſolent.

From *hence* it is *clear* that *He* held that the *blood* did *circulate* continually, falling into the *Heart* by the *vena Cava*, and iſſuing out by the *Aorta* into all parts of the body: that *this* motion of the blood was perceivable by the *Ligatures* at any time, but *moſt manifeſt* in the *intumeſcence* of the veins in *ſleep*: at what time alſo the *blood* or *natural heat* (which is all one to him) did paſs by way of *Anaſtomoſis* out of the *arteries* into the *veins*, as well *as at other times*. So that we are not to imagine any *interrupted circulation* in *him*, but that it did conſtantly flow *night* and *day*, ſleeping and waking, though with *unequal celerity*. In letting of *blood* he tells us, that the blood which firſt iſſues out is *venous*, and blacker then that which follows, and comes more *immediately* out of the *Arteries*. ——*Venas cum Arteriis adeo copulari oſculis, ut vena ſecta primum exeat ſanguis venalis nigrior, deinde ſuccedat arterialis flavior, quod plerumque contingit*. And he explains the *motion of the blood*, and *natural heat* thus, to prevent all ambiguity. *At inſtabit quis in ſomno nequaquam prohiberi calorem in cerebro & ſenſoriis: pulſant enim arteriæ in toto corpore etiam in ſomno. At præſente calore innato debuiſſet duci in actum facultas animalis.* An *calor innatus in ſomno viget in venis & arteriis, non in nervis ſine quibus, non fit ſenſus & motus?* Extra *igitur* ferri *eſt nervos* petere, *intra autem non ſolum ad viſcera, ſed in omnes venas & arterias; unde operationes naturales magis perficiuntur in toto corpore.*

Qu. *Med.* l. 2. *qu* 5 fol. 212. col. 1. lit. c.

Qu. *Med.* l. 2. *qu.* 15. *fol.* 230. col. 1. l. c.

I hope I have now determined the *Queſtion* which hath occaſioned ſo many heats in the world concerning the *Circulation of the blood*, who was the *firſt Inventor* of it? I have demonſtrated that *Andræas Cæſalpinus*, a rigid *Peripatetick* upon *ſenſible Experiments & Mechanical conſiderations*, not *notional apprehenſions*, did not only diſcover this *motion* of the blood

(even *through the Lungs*) but gave it the name of *CIRCULATIO SANGUINIS*; which name is not so proper *in it self*, considering the *Fabrick* of the *veins* and *arteries*, and the *Labyrinth* in which the *blood* moves *universally*, describing a *Line* no way *circular*, as that a man would have pitched upon it in any other *Age* then when *Cæsalpinus* lived, when the *knowledge of the Learned Languages* was less *general* then now, and such a *barbarous stile in fashion*, as our *Inventour* used. But it was not so in the days of Dr. *Harvey*, who publisht his Treatise in 4^to. at *Francfourt* in the year (as I take it) 1628. I must confess I am apt to think upon this consideration, that Dr. *Harvey* (who was a *Peripatetique* Physician, and in whose time at *Padoa*, those *Physicians* did flourish with the greatest repute of *Learning* and skill in *Anatomy*, as well as *Philosophy*) did take up this opinion from *my Author*. And although there wanted not occasion by reason of what *Walæus*, *Riolanus*, *Slegelius*, and *others* had said upon the *point*, for him to declare the *original of the discovery*, yet in his *two* Answers to *Riolanus*, and his Book of *Generation*, He no where asserts the *Invention* so to *himself*, as to deny that he had the *intimation* or *notion* from *Cæsalpinus*; but leaves the *Controversy* in the *dark*: which *silence* of his I take for a *tacite Confession*. His *Ambition* of *Glory* made him willing to be thought the *Authour* of a *Paradox* he had so illustrated, and brought *upon the Stage*, when it lay *unregarded*, and in all probability *buried in oblivion*. Yet such was his *Modesty*, as not to vindicate it to *himself* by telling a *Lie*. And such his *Prudence*, as rather to avoid the *debate*, then resolve it to *his prejudice*. Had Dr. *Harvey* been a *Chymist*, I should have guessed that he might have fixed upon the word *Circulation*, upon *other reasons*, and those *congruous enough* to his *Hypotheses*: but since (especially in the days when he writ) those *Studies* were unknown to *him*, and not valued by *him*, I am inclined to think that *He* did receive his first *Intelligence* from this *Professour* at *Pisa* (where *Harvey* also was) and so improved those *hints*, that

Narravit mih. Nobiliss. & Ampliss. *Nicolaus Oudart*, illustrissimi Principis *Auriaci* Consiliarius, meminisse se audire ipsum *Harveium* profitentem se revera primam *circuitus* sanguinis notitiam, & in eum sectione viventium inquirendi occasionem ex *Herioto* accepisse. Fuit is serenissimi quondam Regis *Jacobi* gemmarius, & Ma-

that in the divulging of his *Opinion*, they are as little to be *ſeen*, as the firſt *indeclines* which *Painters* draw in *Pictures* that are *loſt*, when the *Pourtraict* is finiſhed: or as in the *firſt Appearances* of *Plants* above-ground, where thoſe *leaves* and *buds*, which often give *growth* to the ſucceeding *ſtemme*, *flower*, and *fruit*, are *loſt*, or *altered* ſo as not to be *known*. Let it ſuffice, that Dr. *Harvey* had *parts* and *induſtry* enough to have *diſcovered* it, had he not been *prevented therein*. And I ſhould have imagined that our *Countreyman* had found it out, without any communication with thoſe other books (a thing poſſible enough, and of which we have inſtance in the caſe of *Rudbek*, *Bartholine*, and *Jolice*) but that the reaſons I have alledged render the caſe *ſuſpicious*. Had *Cæſalpinus* writ a *diſtinct Treatiſe*, I doubt not but *much of the Glory* had been *his*: ſince there are as great differences between one *Circulator*, and *another*, and greater, then betwixt him and *Harvey*: but his notions being *confuſedly* laid down *here* and *there* in his *Peripatetick* and *Medicinal* Queſtions, and he being not *ambitious* to pretend to any *new diſcoveries*, only to illuſtrate *Ariſtotles* tenets. I ſhall allow *Harvey* the poſſeſſion of his preſent *repute*: nor do I give my ſelf this trouble of collecting up into a *method* theſe *confuſed aſſertions* of *Cæſalpinus* out of any *envy* to the *dead*, but out of *animoſity* to *Pretenders to Wit and Learning*, that *brave* it thus amongſt us; yet if to be ignorant of *what hath paſſed in the world heretofore*, be an argument of *childiſhneſs*, there is not any thing more *puerile* then this ſort of *Virtuoſi*.

theſeos peritus, eoque nomine Londini celebris. ——— Si verum hoc, verisimilius quoque eſt, vel *ipſum*, vel *Sarpium*, vel *Heriotum*, a *Cæſalpino* accepiſſe. Nemo enim mihi perſuaſerit, ab eorum nemine viſum fuiſſe ſcriptum [*venetiis impreſſum*] quod vel *titulo* ſe, nedum eruditionis varietate atque ſublimitate commendet. *Jo. Artor Vander Linden* diſput. de circuit. sangu. exercit. 9. ſect. 196. & exercit. 16. ſect. 582.

I might not diſmiſs my *Reader*, but that the great noiſe which this *Circulation of blood* makes in the World, enforceth me to ſpeak a little more about the *utility* of this *diſcovery*, which our *Authour* deſcribes to be *the moſt noble of all thoſe diſcoveries in the Oeconomy of humane nature, which Wit and Induſtry have made*. I do confeſs I think the *Arguments* for *it* to be ſuch as admit of no Anſwer in *general*;

but when *we* come to debate *how it paſſeth through the Lungs*, (which *Riolanus* almoſt *invincibly* diſproves) or *through the Septum Cordis*, (which *Riolan* and *Bartholin* aſſerts, but *Harvey, Slegelius, Vander Linden*, and others, reject it on good grounds) what it is *that cauſeth the pulſation of the Heart*? what continues on the *motion of the blood* in the veins, even when a *Ligature* is made betwixt the *antecedent* and *ſubſequent* blood. Whether *the blood be diffuſed into the habit of the body, and reimbibed by capillary veins, or conveyed on by Anaſtomoſes*? whether *there be any difference* betwixt the *venous* and *Arterious blood*? How the *Phænomena* (which *undeniably* are obſerved) about the *pulſe* can be made out; and *particularly how ſome have lived without any Pulſe, others* (which I have known) *in the palpitation of the Heart*, ſuffer no change in their *Pulſe*? How *upon diſſection or wounds ſometimes both ends of the veine divided do bleed? How ſome bleed at the arme without any Ligature*; *ſome upon a double Ligature*? Theſe, and many other *queſtions*, when I come to diſpute with my ſelf, methinks I am forced to conſtrain my judgement in the *aſſent* I give to that *Probleme*: and what I am aſhamed to deny, *I* finde I cannot own without ſome *reluctancy*, which is daily encreaſed in me by *ſcruples* ariſing from the *Practick Part of Phyſick*; nor do I bluſh to declare my ſelf an Abettour only of ſuch *Tenets*, as are conſiſtent with, and illuſtrated by *Practical Phyſick*: it was thought at firſt that this *Circulation of blood* would overthrow all *the uſual Methods of Phyſick*, and introduce *new* and *beneficial* diſcoveries in that part of *Medicine* which is *Therapeutick*. But *Harvey* denieth that it varieth the *Medicine* of the *Ancients*; and *Slegelius* aſſerts the ſame opinion, avowing it to be rather an happy illuſtration, then a *ſubverſion* of the *former praxis*, though it alter the *Theory* much. In fine, thoſe little *advantages* and *Dioriſmes*, which we derive from that *Invention* merit not our notice; nay, any man ſhall with more *aſſurance* bleed in *many diſeaſes* in *ſundry manners* and *different places*, upon *diverſe indications* upon the *old obſervations* and *rules*, then on the *new hypotheſes*, wherein as to the uſe of parts, and *nature* of *humors*, there

is

is as little of *clearneſs* and certainty; as there is *efficacy* in that *practice*, which is *regulated moſt* thereby.

I had forgot to take notice of the *venæ lacteæ* aſcribed to *Aſellius*, the invention of them is thought a great diſcovery, and ſuch as *ſignatiſeth* a man *in this* Age. Yet even thoſe veſſels were known to *Galen*, as *Nardius* proveth out of his book againſt *Eraſiſtratus*, c. 5. and out of the laſt chapter of his *Anatomical Adminiſtrations*. It is true, he calls them *Arteries*; he ſaith they were in the *Meſentery* filled with *Milk*, and that he obſerved them in *young Kids*. And *Hofman* in his *Variæ Lectiones* doth produce out of *Galen*, de uſu part. l. 4. ſect. 19. a place ſo evidently ſhewing that *Galen* and *Herophilus* did recover thoſe *Venæ lacteæ*; that *Veſlingius* cries out in a Letter to him, *Exiſtimo aut nihil cum Herophilo Galenum vidiſſe, aut has* Ἰδίας μεσεντερίους φλέβας, *hos ipſos ductus eſſe, quos* lacteos *cum* Aſellio *nominamus. Quæ ad Pancreatis* ἀδενώδη σώματα (*ex multarum enim glandularum compage conſtructum videtur*) *pertinent.* The place in *Galen* is this, as *Hofman* repreſents it. πρῶτον μὲν γὰρ παντὶ τῷ μεσεντερίῳ φλέβας ἐποίησεν ἰδίας, ἀναχεύμενας αὐτῶν τῇ θρέψει τὸ ἐντέρων, μὴ περαιουμένας εἰς τὸ ἧπαρ. Ὡς γὰρ καὶ Ἡρόφιλος ἔλεγεν εἰς ἀδενώδη τινὰ σώματα τελευτῶσιν αὗται αἱ φλέβες, τὸ ἄλλων ἁπάντων ὅπη τὰς πύλας φερομένων. Which *proof* as it is perſpicuous enough to ruine the diſcovery of the *Venæ Lacteæ*, and the deducing of *them* unto the *Glandules of the Meſentery* (beyond which *Herophilus* and *Galen* did never trace the *journey of the Chyle*, but imagined thoſe *veins* to nouriſh the *Meſentery*) ſo I think that the *invention* of the *Ductus Thoracius* belongs to *Andr. Veſalius*, and *Barthol. Euſtachius*: the one more *obſcurely* propoſeth *it*, the other more *openly*.

Nardius. noct Genial. 4. p. 412.

Epiſt xxi.

C. Hofman var lect. l. 2. c. 2.

Andr. Veſalius de fabrica corporis humani l. 3. c. 7. p. 291. Edit. Venet. 1568.

Jo Ant. Vander Linden de circuitſangu. exerc. 9

——"*Adeo ut mihi etiam perſuaſum ſit, quamvis id nunquam* "*viderim; interdum a ſiniſtro cœnæ caudicis latere, ubi jugulum* "*contingit, venam depromi, quæ ſecundum ſiniſtrum vertebra-* "*rum latus declivis ducta, ſiniſtris coſtis ſamos offerat: illa* "*quam ſine pari nuncupamus, dextras coſtas alente. Atque* "*hujuſmodi venæ ortum, non tantum a jugulo primum poſſe fieri;*

" *ſed paulo infernis, etiam agnus atteſtatur: in quo tale aliquid*
" *ſemel obſervavi.*

" Viden' veniſſe in rem, & quaſi in manu jam habuiſſe il-
" lud Ariadnæ filum, quod ſecutus penetrare in naturæ La-
" byrinthum, majoremque ſibi gloriam comparare potuiſ-
" ſet? ſed quo fructu? Audi ſis, & diſce, quam homini, ſci-
" entias ſectanti, neceſſarium ſit, etiam in naturalibus eum,
" qui ſui juris & muneris fecit, *docere homines ſcientias &*
" *artes*, Pſ. 94. v. 10. Jer. 28. v. 26, precari, Revela oculos
" meos ut cernam mirabilia in operibus tuis, ex Pſ. 119. v. 18.

" *Verum*, inquit, *ejuſcemodi non niſi rariſſime occurrentes ve-*
" *narum ſeries, anatomes ſtudioſo non aliter expendendas pu-*
" *tarim, quam ſi interdum ſextus in manu digitus, aliud ne mon-*
" *ſtruoſum ſe ſpectandum offerret. Adeo ut ſiquando in publicis*
" *ſectionibus hæc obſervo, ea tanquam non eſſent, tacite præter-*
" *eamne artis candidati in omnibus corporibus hæc obſervari ar-*
" *bitrentur.*

" Quanto egregius, & propter hoc non unam atque im-
" mortalem laudem meritus *Barth. Euſtachius*: qui non ſo-
" lum candide exponit, quod vidit; ſed et præmiſſo, quod res-
" merebatur, præloquio conatus eſt poſteriorem ſtudia ex-
" citare ad ulteriorem inquiſitionem et perfectiorem cogni-
" tionem. Neque enim ignorabat, *rei quidem inventionem*, ἐυτυχίας munus eſſe: at vero ejus *plenam cognitionem* τῆς
" ἐυτεχνίας opus eſſe. Sed audiamus ipſum.

" *Ad hanc naturæ providentiam quandam equorum venam a-*
" *lias pertinere credidi: quæ cum artificii & admirationis plena*
" *ſit, nec delectatione ac fructu careat: quamvis minime ſit ad*
" *Thoracem alendum inſtituta: operæ pretium eſt ut exponetur.*
" Itaq; *in illis animantibus*, pergit *ab hoc ipſo inſigni trunco ſini-*
" *ſtri juguli, qua poſterior ſedes radicis venæ internæ jugularis*
" *ſpectat, magna quædam propago germinat: quæ præterquam*
" *quod in ejus origine oſtiolum ſemi-circulare habet, eſt etiam*
" *ALBA ET AQUEI HUMORIS PLENA; nec longe ab*
" *ortu in duas partes ſcinditur; paulo poſt rurſus coeuntes in u-*
" *nam: quæ nullos ramos diffundens, juxta ſiniſtrum vertebra-*
" *rum latus, penetrato ſepto tranſverſo, deorſum ad medium uſq;*
" *lumborum fertur: quo latior efferta, magnamq; arteriam cir-*
" *cumplexa, obſcuriſſimum finem, nihilq; adhuc non bene perce-*
" *ptum, obtinet.*

Since

Since the writing hereof, I have met with a book containing certain Letters of *Marcellus Malpighius*, and *Carolus Fracaſſatus*; in which it is obſervable that *Fracaſſatus* (the *Anatomy*-Profeſſour at *Piſa*) doth aſcribe the *Invention* of the *Circulation of the blood* to *Cæſalpinus*; and of the *ductus Thoracius* to *Euſtachius*: His words are theſe: "*Adeo oſcitantia Autorum quædam tam male præponuntur, ac tanguntur, ut* "*oporteat alios eadem repetere, ac ditare novis elucubrationibus,* "*ac ſi nunquam fuiſſent.* Sanguinis Circulatio, Galaxia in "Microcoſmo humano, *ſcilicet via Chyli Cor, nonne* Cæſal- "pinum *agnoſcit Authorem, ac* Euſtachium de vena ſine pari? "*Et tamen ſoles in* Scholis *Autores crepant Anglos* Harvæus, "*& Diepenſes* Pecquetos: *non tamen ſpernendi, qui verum* "*rudimenta ponunt, etiamſi infecto nec abſoluto opere ceſſave-* "*rint: qui invenit anticipavit laborem & curam quærendi:* "*& ad minora vocatur, ſi quæſtionis ſolicitudo & jactatio tolla-* "*tur: par tamen decus manet & illum, qui primum invenit,* "*& qui poſtremum perfecit, neſcio enim an præſtet inveniſſe,* "*an ditaſſe.* *Fracaſſatus* de cerebro, p. 202.

Having ſaid thus much, I leave Mr. *Glanvill*, to anſwer thoſe little *quillets* of his, which can convince none but *Shallow-brain'd* and *Comical Wits*. ___ "If *they knew theſe* grand "Theories formerly; how chanceth it that they ſpeak no "more of things, which no doubt they had frequent occaſi- "ons to mention? How come they to be *left* without memory "among their followers, who were ſuch *ſuperſtitious porers* "upon their writings? How chanceth it not to have been "ſhewn to be lodged in thoſe Authors before the days of Dr. "*Harvey*, &c. when Envy had impregnated and determined "their *imaginations*? Let *illiterate perſons* and Mathema- "ticians be ſwayed againſt *plain proof* by theſe Arguments. I think in ſtead of *Temples* and *Altars* to be erected to *theſe Inventors*, there is more need of a *Schoolmaſter* and an *Antiquary*, the one to teach *them humane learning*, the other to inſtruct them in *paſt diſcoveries*; leaſt, with much trouble and pains our new Philoſophers ſhould *finde out* again the *Art* of *Printing*, or *Etching*: the uſe of *Gunpowder*, or the *Load-ſtone*.

Of

Of Transfusion of Blood-- into Animals.

Plus Ultra. pag. 17.

" THus, Sir, *I have done with Inſtances of* Anatomical " Advancements, *unleſs I ſhould hitherto referre the* " *late noble* Experiment of *Tranſfuſion of the Blood,* " *from one living* Animal *into* another, *which I think very fit to* " *be mentioned; and I ſuppoſe it is not improper for this place:* " *Or however, I ſhall rather venture the danger of* impropriety " *and* miſplacing, *then omit the taking notice of ſo* excellent " *a* Diſcovery, *which no doubt future* Ingenuity *and* Practice " *will improve to Purpoſes not yet thought of; and we have very* " great likelihood *of advantages from it in* preſent Pro- " ſpect.

" *For it is concluded, That the greateſt part of our* diſeaſes, " *ariſe either from the* ſcarcity, *or* malignant tempers *and* " corruptions *of our* Blood; *in which caſes* Transfuſion *is an* " obvious Remedy; *and in the way of this Operation the* pec- " cant blood *may be drawn out, without the danger of too much* " enfeebling *Nature, which is the grand inconvenience of* meer " Phlebotomies. *So that* this Experiment *may be of* excel- " lent uſe, *when Cuſtom and Acquaintance have* hardned *men* " *to permit the Practice in* Pleuriſies, Cancers, Leproſies, " Madneſs, Ulcers, Small-Pox, Dotage, *and* all ſuch like " Diſtempers. *And I know not why that of* injecting prepared " Medicines *immediately into the blood, may not be better and* " *more efficacious then the ordinary courſe of Practice: Since* " *this will prevent all the danger of fruſtration from the* loath- " ings *of the* Stomach, *and the diſabling, clogging mixtures* " *and alterations they meet with* there, *and in the inteſtines, in* " *which no doubt much of the* ſpirit *and* virtue *is* loſt. *But in* " *the way of* immediate injection *they are kept intire, all thoſe* " *inconveniences are avoided, and the Operation is like to* " *be more ſpeedy and ſucceſsful. Both theſe* noble Experi- " ments *are the* late Inventions of the *ROYAL SOCIETY,*

ch w

" *who have atteſted the* reality *of the former, that of Transfuſion*
" *of* Blood *by numerous trials on ſeveral ſorts of* brute Ani-
" mals, *Indeed the* French *made the* Experiment firſt *upon*
" humane Bodies, *of which we have a good account from Moun-*
" *ſieur* Dennis. *But it hath been practiſed alſo with fair*
" *and encouraging ſucceſs by our* Philoſophical Society. *The*
" other *of* injection, *if it may be mentioned as a* different in-
" vention, *was alſo the Product of ſome* generous Inventors;
" *though indeed more* forward Forreigners *have endeavoured*
" *to* uſurp *the* Credit *of* both. *This latter likewiſe hath ſuc-*
" *ceeded to conſiderable good effects in ſome* new *Trials that*
" *have been made of it in* Dantzick, *as appears in a Letter*
" *written from Dr.* Fabricius *of that City, and Printed in the*
" Philoſophical Tranſlations.

I ſhall not quarrel with Mr. *Glanvill* for miſplacing this diſcourſe about the *Transfuſion of Blood*, but I think all the World will condemn him for aſcribing either the invention of *Transfuſing blood*, or of *injecting Medicaments into the veins*, unto the *Society*. That the latter was a thing much practiſed by Dr. *Wren* and others in *Oxford*, before the Reſtoration of his Majeſty, and before that ever the *SOCIETY* was thought upon, is a thing known to all that were at thoſe days in that *Univerſity*. I ſaw my ſelf in thoſe days the Dog into whoſe *veins* there was *injected* a Solution of *Opium*, at the Lodgings of the Honourable *Robert Boyle*, of which he makes mention in his ſecond diſcourſe of the *Uſefulneſs of Natural Philoſophy*, and *Borrichius* in his Letters to *Bartholinus*.

As for that other of *Transfuſing the blood out of one Animal into another*, if the Queſtion be *who firſt propoſed it into the World to be tried*, it is certain that *Libavius* firſt did that, at leaſt I know not any more ancient then *He*. That Learned man above *Fifty* years ago, ſo plainly deſcribes the Transfuſion, that one can hardly diſcourſe of it with more *clearneſs*, then *there* is done in theſe words. *Adſit Juvenis robuſtus, ſanus, ſanguine ſpirituoſo plenus: Adſtet exhauſtus viribus, tenuis, macilentus, vix animam trahens. Magiſter Artis habeat tubulos argenteos inter ſe congruentes, aperiat arteriam robuſti & tabulum*

Thoſe Forreigners will rectifie hereafter their miſtakes, and not attribute the *injecting of Medicaments* to their invention; as *Caſpar Schottus* in Mirab. Art. l. xi, c. 21. p. 891. & *Phil. Jac. Sacks* in Ocean Micro-microcoſm. ſect. 155 have done, unjuſtly magnifying *Solertiſſimam Induſtriam & Experientiam* of theſe Pretenders *Andr. Libav.* defenſ. Syntagm arcanor. adv. *Henning. Scheunemem* act 2. c. pag 8. edit. Francofourt. A. 1615.

tubulum inſerat, muniatque mox & ægroti arteriam findat, & tubulum fœmineum inſigat: jam duos tubulos ſibi mutuo applicet, & ex ſano ſanguis arterialis calens & ſpirituoſus ſaliet in ægrotum, unaque vitæ fontem afferet, omnemque languorem pellet. This allegation was made uſe of by an *Italian Philoſopher*, and ſilenceth all thoſe in *England*, or *France*, that pretend to the *Glory* of having firſt *propoſed*: So that the Author of the *Philoſophical Tranſactions* confeſſeth it in theſe words [a]. This indeed is clear enough, and obligeth *us* to averre a greater *Antiquity* of *this operation*, then before we were aware of, though 'tis true, *Libavius* did not *propoſe* it, but only to mock at it (which is the common fate of *new Inventions* in their Cradle) beſides that, He contrives it with great danger both to the *Recipient* and *Emittent*, by propoſing to open *Arteries* in both, which indeed may be practiſed upon *Brutes*, but ought by no means upon *Man*. Till that learned *Italian* had inſtructed the *Virtuoſi* in the point, there had been a great Controverſie agitated between the *French* and *Engliſh Societies* about the *Invention*. The former pretended, that it was *mentioned* firſt amongſt *them* about *eleven years* ago, at the Aſſembly, in the houſe of *Mounſieur de Montmor*, and that the publick is beholding to that *Monſieur* for this *diſcovery*, and the *benefits* and advantages that ſhall be reaped *thereby*. But about the perſon that ſhould *firſt* mention the deſign, the *French* vary. *Monſieur de Gury* fathers it upon the Abbot *Bourdelot*: but the Author of their *Journals* upon a *Benedictine* Friar. Our *Society* having given the world occaſion to take notice of *it publikely*, and having otherwiſe long before purſued the *Oxford-Invention* of *injecting Liquors into the veins*, thought *themſelves* injured in this, that the *French* ſhould uſurp the *Credit* of ſuch a *diſcovery* as had its firſt *birth* in *England*, upon a pretence that it was *conceived* in *France*: it being notorious, the *French* took *occaſion* to try it by the *Example* of the *Engliſh Virtuoſi*: and there being no *publick record* cited, declaring the time and place of the *Invention propoſed* the Method to *practiſe* it, and the ſucceſs of the *Execution*. Thereupon began a *Paper-ſcuffle* betwixt the *Gazettiers* o-

thef

[a] Philoſ. Tranſact. Numb. 37. p. 740.

By his leave it infers only the *mention* of it to be more *ancient*, not the *Operation*. *Libavius* propoſeth it out of ſome *Paracelſian* Magical *Writer*, and not from his *own Fancy*: adding that the *Phyſician* who practiſeth this *Tranſfuſion*, deſerves *Hellebore* himſelf.

See Mr. *J. Denny*'s Letter in the Tranſact. numb. 27. Ib. num. 28.

the *Curienſe* which any man may reade with ſome *pleaſure*, becauſe they had on both ſides ſuch little *Logick*, as to argue from the *mentioning of a deſign*, to the *effecting it*. If the way of *Argumentation* be *good* and *ſolid*, then *Ariſtotle*, and ſuch of the *Ancients*, as *propoſed* the *ſquaring of the Circle*, muſt not be denied the glory of being *Inventors of it*: So they which firſt propoſed a *perpetual motion*, or the *North-weſt Paſſage*, may go for *Inventors of them*: yet are none of *theſe* things yet diſcovered. Oh! new *Correlates*, and worthy of *our Inventors*! Long ago *Ariſtotle* and the Common *Dialecticks* told us, *Datur ſcibile de quo non datur Scientia*. But none like our *Anti-Logicians* ever taught, there were a ſort of *Inventors* whoſe *Inventions* were yet to *ſeek*. All that our *Inventors* did, was, that after Dr. *Lower* had firſt *diſcovered* and *practiſed* the *Tranſfuſion* at *Oxford* in *February* 1665. They on the *ſeventeenth of May* following 1665. gave order that there ſhould be *trials* made for *tranſfuſing* the blood: but *their trials proving lame for want of a fit Apparatus*, and a well continued Method of *Operation*: the *Dr.* ſent them a *convenient Method* for effecting the thing. Before *this*, there never was any *mention* or *propoſal* made at the *Society* concerning the *Tranſfuſion*, as I am certainly informed by one of *their Number*, who hath examined their *Journal Books*, in which ſuch *Propoſals* and *Experiments* are recorded. Nay, they were ſo far from pretending to it at firſt, that when it was mentioned unto them by Mr. *Boyle*, there were ſome as well *ſevere* as *ingenuous* Critick's, who thought it ſomewhat *ſtrange* and *bold* for him to affirm that the *Dr.* had made it ſucceed. And beſides, I obſerve that Mr. *Boyle* in his Letter to Dr. *Lower* (who hath vindicated the *Invention* to himſelf in his late Book *de Corde*) doth not ſay that ever the *Society* had *thought* of or *attempted*, or *deſigned to attempt* the thing. He calls it *inſolitum & inſperatum conamen*. June 26. 1666. and deſires *He* would acquaint the Society with the manner how he atchieved it. Now ſince that neither was Dr. *Lower* then of the *Society*, nor *any way* entitles *them* unto *it*, but *himſelf*, and that in a Treatiſe wherein he doth not ſo much as call *him-*

See Tranſact. Num. 28. pag. 514.

In the Transactions *numb.* 37. *pag.* 371. *The* Gazettier *affirms, that upon further inveſtigation it was by* good proof (*which is in* his hands) *proved, that the* invention *had been known to ſome* Ingenious *perſons in* England *thirty years ago. If ſo, then is not the* Society *the* Inventors *of it, except we will ſay, that* Societies *as well as* individual *ſoul's do* pre-exiſt! *But may not a man ask our* Gazettier, *where is the* publike record *of this* Invention? *what Account is there of the* Method *with which it was practiſed? with what ſucceſs? How comes all this to be conceal'd till after* Dr. Lower *atchieves it, and the* French *pretend to it? would any man have concealed their claim to the* Diſcovery, *after that it was become the talk of* Europe, *the Darling of the* Society, *and worthy to be diſputed for by the* French? *why did they not put in their Claim,* being within hearing *till about* three years *after,*

ſelf a *Member of that Aſſembly,* ſet any man judge with how much truth this other *Diſcovery* is aſcribed to theſe *NEW EXPERIMENTATORS,* by our *Virtuoſo.* But leaſt I ſhould ſeem to deal too *ſeverely* and *malciouſly* with them, rather then it ſhall be ſaid *That they invented nothing,* I grant, that *They* invented a *LYE*; and ſhall conclude the Debate by repreſenting the words out of *their Tranſactions*, by which they aſſume to *themſelves* the *Credit* of the *Invention,* and by a *dubious wording* and *pointing* of the *Period,* inſinuate as if Dr. *Lower* as well as Dr. *King* had been encouraged to the *Attempt* by the *Society.*

Philoſoph. Tranſact. Numb. 27. *pag.* 490.

" *How long ſoever that Experiment may have been conceived*
" *in other parts (which is needleſs to conteſt) it is notorious that*
" *it had its* Birth *firſt of all in* England; *ſome ingenious per-*
" *ſons of the* Royal Society, *having firſt* ſtarted it there, *ſe-*
" *veral years ago, (as appears by* their Journal) *and that dex-*
" *trous* Anatomiſt, *Dr.* Lower, *reduced it into practice, both*
" *by contriving a Method for the* Operation, *and by ſucceſs-*
" *fully* executing *the ſame, wherein* he *was ſoon overtaken by*
" *ſeveral happy Trials of the skilful hand of Dr.* Edmund King,
" *and others encouraged thereunto, by the ſaid* Society, *which*
" *being notified to the World Numb.* 6. 19. & 20. *of theſe Tranſ-*
" *actions printed* Novemb. 19. & Decemb. 17. 1666. *the* Ex-
" periment *was ſoon after that time heard of to have been tried*
" *in forreign Parts, without hearing any thing of its having*
" *been conceived* ten years ago.

In which relation, I muſt take notice that it doth not *really* appear in their *Journal-books,* that ever any ſuch thing was ſtarted by any perſons *how ingenious ſoever* of *their Society*; Dr. *Lower* being not *then,* nor *long after* in the *Hiſtory of the Royal Society* reckoned as a *Member* of it. Next-

tha.

that the *interpunction* of the period is ſo *equivocally* placed and penned, that the *unwary Reader* may think that Dr. *Lower*, as well as the *others* was encouraged to the *trial* by the *Society*. Whereas *he* was not, whatever the *others* were. Again, it is *diſingenioufly* ſaid, that *he* was ſoon overtaken by *ſeveral happy Trials* of Dr. *Edmund King*, and others, encouraged thereto by the *Society*. Since it appears by the letter of Mr. *Boyle*, that the *Society* knew not how to do the thing in *June*, which Dr. *Lower* had effected in *February*, and the fame thereof at that time was ſpread over *England*. In *July* Dr. *Lower* acquainted the *Society* with the *manner of the Tranſfuſion*, whereof Dr. *Wallis* had given the *Society* an imperfect account a little before of what he had ſeen Dr. *Lower* do at *Oxford*. So that for at leaſt *four* or *five months*, the *Members* of the *Society* did not overtake Dr. *Lower*. But after *they were acquainted with the contrivance*, they invented *it very clearly*.

From *hence* it is eaſie for any man to judge with how much *right* Mr. *Glanvill* doth ſay, that both the *injecting of Medicines, and tranſfuſing blood into the veins of Animals*, thoſe *Noble Experiments* were the *late Inventions of the* SOCIETY. I ſhall now proceed to inquire into the *Utility* of *them*; thereby to diſcover how *noble* and *excellent* they are, and what *advantages* we may hope to derive from them hereafter.

Becauſe this *Tranſfunding of blood* hath hitherto been looked on as the *primary Invention*, and the moſt *famed* of any the *Society* were ever *intitled* unto: and that they *themſelves* have particularly concerned themſelves in aſſerting it to be their *diſcovery*, to the end that every *Reader* may the better be able to judge of the *Controverſie*, without being forced to go ſeek out amongſt the ſcattered *tranſactions* and elſewhere, ſeveral *Hiſtories* that are material to the paſſing a right judgement; I ſhall crave pardon if I do relate particularly the matter of *fact*, and what hath been ſundry times performed by the *Engliſh*, *Italian* and *French Virtuoſi*, with every circumſtance, both as to injecting of *Medicines*, and of blood into the veins.

As to the *injecting of Medicaments into the veins*, it is an *Experiment* that I am apt to think was firſt tried by the *Engliſh*, and as a *curioſity*, it was not *unpleaſant*; but that it ſhould be ſo advantageous a diſcovery as Mr. *Glanvill* repreſents it is like to be, I do not beleeve. There was a time when men had regard to their *Conſciences*, and what could not be adminiſtred but upon *prudential hopes* of advantage to the *Patient*, no approved *Phyſician* durſt, or would give to any ſick perſon: but in this *Age, ſuch as ought to proteſt againſt it*, are as forward as any to forget *theſe conſiderations*, and prompt men on to practices without either regarding whether the effect be not *Murther* in the *Phyſicians*, beſides the ill conſequences to the *diſeaſed*. In the *injecting of Medicaments*, I muſt complain that neither the *Operation of Medicaments immediately injected into the blood and veins* is *known*, nor the *doſe*; and conſequently the *Project* not like to improve *Phyſick* at all, *unleſs* our *Magiſtrates* will *licence men* to try ſo many *Experiments*, even to the *apparent hazard* or certain death of the *parties*, and may regulate and authenticate the practice in ſuch manner as becomes a *Baconical* Experiment: and to encourage Rational men to this procedure, there ought to be a greater *deficiency* in *Phyſick*, then yet appears, and a more *bopeful ſucceſs* then any man can yet expect, ſuppoſed by this way. A *Paynim* told us,

Nulla unquam de morte hominis cunctatio longa eſt.

A ſober *Phyſician* will look upon the act to be as indiſcreet, as the *Comedian* deſcribes *love* to be, *Quæres in ſe neque conſilium, neque modum habet ullum, eam conſilio regere non potes.* That there is no *probability* that this way of *Medicine* can ever amount to any thing, appears from this conſideration, that *Liquors immediately injected into the blood*, have a different *Operation there*, then when taken in by the *Stomach*: and that the *mixtures of Liquors* with *blood* upon *Phlebotomy* in a Pottinger, gives no light to the *Experiment*. As I ſhall now ſhew.

Seignior Fracaſſati Profeſſor of Anatomy at *Piſa* tried

theſe

theſe Experiments *by injecting Medicaments.*

1. Having injected into the *jugular* and *crural* veins of a *Dog* ſome *Aqua fortis* diluted, the Animal died preſently: and being opened, all the *blood* in the *veſſels* was *coagulated* and *fixed*: but that which was in the *Viſcera* (which I dare not Engliſh *Guts*, but take it to denote the *Heart*, *Liver*, *Lungs*, *Spleen*, where the blood paſſes *extravaſated* through: though the *Tranſactions* render it *Guts*, and deſtroy the antitheſis betwixt *vaſa* and *viſcera*) did not ſo eaſily *coagulate*. It was alſo obſerved that the *great veſſels* were *burſt*, or as it were *cut* aſunder, yet have I known who hath put *Aqua fortis* into *cooling Juleps* in Fevers, as others do *ſpirit of Vitriol* without any *harm*.

Tranſact. num. 27. *p.* 490 491.

Car. Fracaſſat. *Ep. Anat. de cerebro. p.* 252, 253, 254.

2. There was alſo *infuſed* into another *Dog*, ſome *ſpirit of Vitriol*, which had not ſo preſent an effect: for the *Animal* complained a great while, and foamed like *Epilepticks*, and had its reſpiration very thick: and obſerving the beating of his breaſt, one might eaſily judge, the *Dog* ſuffered much: who dying at laſt, his *blood* was found fixed in the *veins*, and *grumous*, reſembling *Soot*: whereas in the Experiment with *Aqua fortis* (which may as eaſily be given inwardly as ſpirit of *Nitre*) the blood is not ſaid to have been changed in its *colour* from other *coagulated blood*. It was alſo obſervable (though the Tranſactions minde it not) that the *blood* in this laſt *Dog* was not upon *coagulation* continuous in *the veins*, but *broken* and ſevered into *parcels*.

3. There was alſo injected into the *jugular* of another *dog*, ſome *oyle of Sulphur per campanam*, but he died not of *it*, though this *infuſion* was ſeveral times tried on *him*. And the wound being cloſed, and the *dog* let go, he went into all the corners of the room, ſearching for meat, and having found ſome bones, he fell to gnawing them with a ſtrange avidity, as if *this Liquor* had cauſed in him a great appetite.

4. Another *dog*, into whoſe veins ſome *Oyle of Tartar per deliquium* was injected, did not eſcape ſo well: for he complained much, and was altogether ſwoln; and then died: Being opened, the *Spectators* were ſurpriſed to finde his

blood

blood not *curdled*, but on the contrary more *thin* and *florid* then ordinary.

Dr. *Lower* de motu Cordis pag. 119.

5. Dr. *Lower* having extracted half a pound of blood out of the *crural urine* of a *Maſtiff dog*, did inject the like quantity of warm *milk* into him; within half an hour the *dog* became very *ſick*, breathed with difficulty, and ſeemed to labour much with his *heart* and *diaphragme*, and after to palpitate, tremble and ſigh grievouſly, and at length miſerably died. Upon diſſection he found the *vena cava*, the ventricles of the *heart*, the veſſels of the *Lungs*, and the *Aorta full of blood* and milk *coagulated* together, and the *concretion* was ſo hard, that it was not eaſie to part it. This he tried but once. But *Monſieur Dennys* the *French* Phyſician ſaith, he tried it with a different ſucceſs. For having ſyringed about a quarter of a pint of *milk* into the *veins* of an *Animal* (he tells not *what*) and having opened the ſame ſome time after, he found the *milk* ſo perfectly mixed with the blood, that there was not any place in which appeared the leaſt footſtep of the *whiteneſs* of the *milk*, and all the blood was generally more *liquid*, and leſs apt to *coagulate*.

Tranſact. num. 27. pag. 49,.

6. I received an account of ſome Experiments, from one much verſed in theſe *injections* (which he may one day acquaint the world with) to this effect That the infuſion of *Crocus Metallorum*, injected in a leſs quantity then otherwiſe (*viz*, ʒ ß) will work by vomit in a *dog*, almoſt preſently, and very ſtrangely, and make him grievouſly ſick. Yet Dr. *Wren* informs Mr. *Boyle*, that a moderate doſe of the infuſion of *Crocus Metallorum* did not much move the *dog* that he injected it into: but a large doſe of *two ounces* or more wrought *ſoon*, and ſo *violently*, that he *vomited up life* and all. That a *dog* will take two drams of *Opium* into his *Stomack*, and ſeem never the worſe, if you keep him from lying down *half an hour after*; but *two drams* of *Poppy-ſeeds* made into an *Emulſion*, and injected into his *veins*, will kill him *preſently*.

Mr. *Boyle* of the Uſefulneſs of Nat. Philoſ. part. 2. p. 54, 55.

7. Mr. *Boyle* ſaith, that he conveyed a ſmall doſe of the *tincture of Opium* into a *dog* this way, which began to *work* ſo *ſpeedily* upon the *brain*, that he was ſcarce untied before

Vid. ſupra. p. 53, 54

the

the *Opium* began to diſcloſe its *Narcotick* quality; and almoſt as ſoon as he was upon his feet, he began to *nod with his head*, and reel and faulter in his place; but being kept *awake*, and in motion, by whipping up and down the Garden, after ſome time he came to himſelf again, and not only recovered but began to grow fat ſo manifeſtly, that 'twas admired.

8. A certain *German* Count coming into *England*, relates an Experiment, which he ſaw in the preſence of Pr. *Rupert*. After ſome *blood* taken from a *dog*, there was injected into him a ſmall quantity (*portiuncula*) of *Spaniſh* wine; within ſometime after the *dog* was perfectly *drunk*, being giddy, performing ſundry ridiculous actions, then *vomiting* with a profound ſleep. *Phil. Jac. Sachs* in Ocean. macro-microcoſm. ſect 155.

9 Dr. *Fabricius* Phyſician to the City of *Dantzick* injected purgatives into *humane bodies*, with this effect. A ſtrong bodied *Souldier* being dangerouſly infected with the *Pox*, and having grievous protuberations of the bones in his armes, *two drams of a purgative liquor* were injected: he preſently complained of great pains in his *elbows*, and the little *valves* of his arm did ſwell ſo viſibly, that it was neceſſary by a *great compreſſion* on's fingers to ſtroke up that ſwelling towards the Patients ſhoulders. Some four hours after it began to work, not very troubleſomely; and ſo it did the next day, in ſo much that the man had five good ſtools with it. Without any other remedies thoſe protuberances were gone, nor are there any footſteps of the diſeaſe left. Two other trials were made upon women, the one a *married woman* of 35, the other a *Servant-maid* of 20 years old: both from the birth had been grievouſly troubled with *Epileptick* Fits, ſo that there was little hopes of curing *them*. There was injected into *their veins* a *laxative roſin*, diſſolved in an *Antiepileptical ſpirit*; the *firſt* of theſe had gentle ſtools, ſome hours after the *injection*; and the next day the *Fits* recurred now and then, but much milder; and are ſince quite vaniſhed. The *Maid*, ſhe went the ſame day to ſtool four times, and ſeveral times the next: but by going into the Air, and taking cold, and not obſerving any diet, caſt her ſelf away. 'Tis remarkable, that it was common *to all three*, to vomit ſoon after the *injection*, and that *extreamly*, and *frequently*. Transact. numb. 30. pag. 564, 565.

I have

I have not time to adde any more of theſe kind of *trials*: but from hence it is evident, that things *operate* (where they do operate in the ſame manner) in a leſſer *doſe*, then when taken into the *Stomach*, and with more *violence*. That oftentimes ſuch things as are *innocently* taken into the *Stomach*, are mortal when *injected immediately into the blood*. That although learned Phyſicians have made *little* or *no difference* betwixt the operation of *Oyle of Sulphur*, and that of *Vitriol*, yet by this *Experiment* there is found to be a quite *different effect*. So the *Salt of Tartar* (which is as innocent as Salt of *Wormwood*, or any *ſuch Salt*) had a pernicious effect upon the *dog*, though *diſcrepant* from the others.

Vulgo hactenus a non paucis ſpiritus Vitrioli, *&* Sulphuris *pro diverſis rebus habiti ſunt: adeo quidem ut nonnulli* flores ſulphuris *&* acidum *ad eoſdem pulmonis morbos exhiberent: ſed* valde *imperite cum* acida *omnia ſint pectori inimica, &* ſpiritus Sulphuris *&* Vitrioli *eſſentia nullo modo differant, ſed ex eadem re generentur, & parentur. Etenim* ſpiritus Vitrioli *&* Sulphuris *eundem* ſaporem, colorem *&* omnino eaſdem qualitates *&* effectus *habent, & ad* eoſdem uſus *in medicina adhibentur: nondumque inventus eſt, qui peculiarem aliquam, ſeu manifeſtam ſeu occultam qualitatem in* ſpiritu Sulphuris *monſtrare potuerit, quæ non etiam in* ſpiritu Vitrioli *ſit.* Sennert. *in Paralipomen. ad inſtitut. l. 5 part. 3 ſect. 3 c. 5.*

As to the *Experiments* of Dr. *Fabritius*, they do not give much of *Encouragement* to the *Trial*, for the one died which had the moſt of *youth*; and though *her* death be attributed to *other circumſtances* and neglects, yet either thoſe are *trivial*, or for ſome (*unknown*) length of time there muſt be *greater care* then *ordinarily* after *Phyſick*, otherwiſe *ſmall accidents* become *mortal*. And the *extreme* and *frequent vomitings* (which here happen from the ſufferings of the *Heart*, and not the Stomack) render the courſe more *hazardous* to *tender Stomachs*, and *weak Conſtitutions*, then Mr. *Glanvill* ſuggeſts. So that the *loathings of the Stomach* are not prevented *by this way*, nor the ſucceſs very *inviting* (how ſpeedy ſoever) upon thoſe *Experiments* any more then from the *Churliſh Phyſick* of the *ancient* and moderate *Chymiſts* of Mr. *Odored*'s party, which *wiſe-men* will not imitate. I wonder the *laxative Solutions* were not ſet down that we might judge of their *ſtrength*: and that the way of dieting and *ordering of them afterwards* was omitted: whereas the knowledge thereof might avail to prevent the *ill conſequence* which befel the *Maid*.

I ſhall now conſider the effects which the *ſeveral Liquors* have

have upon a *mixture* with the *blood*, when taken warm in a *Pottinger*, and thoſe *affuſed* to it. This is a Practice which the Honourable Mr. *Robert Boyle* imparted to the *Royal Society* in *December* 1664. and thinks that *Fracaſſati* may have taken his hint from it, to *inject thoſe Liquors*: but I finde a Letter from *Leyden* ſent to *Bartholinus*, Dated *Jan.* 9. 1662. in which there are ſeveral *Experiments* of that kind, which I ſhall ſet down preſently. If *I* placed any great value upon the *Experiment*, *I* could put in for the Practiſer of it at *Stratford upon Avon* in 1660. and prove that I made ſome *Solutions* of *Salt of Aſh*, *Salt of Wormwood*, and *Salt of Tartar*, and received the blood of *ſheep* into the *glaſſes* in which *they were*, to try the differences betwixt thoſe *Salts*, whether they were of the ſame nature (ſo that it was indifferent whether one uſed Salt of *Wormwood*, *Carduus Benedictus*, *Yarrow*, or *Mugwort*) or that there were *any difference*. Which laſt *Angela Sala* denies, though other *Chymiſts* affirm it. But after that *I* had enquired into that Controverſie by ſeveral ways, *I* went to *Jamaica* and neglected the *Experiment*. But ſince that *I* ſee that every *unprofitable trifle*, becomes a *famous* and *noble Experiment*, and if it bring no preſent *Emolument*, yet at *leaſt* it becomes *Luciferous*, and (as they ſay) puts us in the Proſpect of *ſeveral great advantages*; at leaſt, *more and greater things will be diſcloſed by it, when future ingenuity and diligence hath improved and perfected the invention.* Since that time *I* have made many *Eſſays* about the *mixture* of *ſundry Liquors*, with the blood of *Sheep*, *Lambs*, *Calves*, *Cows*, *Oxen*, *Hogs*, *Poultry*, and that in ſeveral manners.

Angelus Sala Tartaralog. ſect. 3 c 2 p. 133.

I have received the blood of *ſeveral creatures* upon *warm ſolutions* of *ſundry Salts*, of *Allom*, *impure Salt-peter*, Sal *Prunellæ*, *Salt of Nitre*, upon ſolution of the ſeveral *Vitriols*; upon *Steel-wine*, *Vomitive wine*, *Sack*, *French-wine*, and *Malaga*, upon *ſpirit of wine*, *ſpirit of Cider*, and *ſpirit of the grounds of Beer*; upon *warm Urine*, upon mixtures with *ſpirit of Vitriol*, and *oyl of Sulphur*, and *Juice of Lemons*, and *Oranges*, upon the *rare liquor of* Salt-peter; upon *it*, after *it hath paſſed the Aſhes*, and upon the *Mothers of it*, and many other trials with oyle of *Wormwood*, *Amber*, *&c.* diſſolved in *ſpirit of wine*.

I have alſo poured upon the *Maſs*, after it hath coagulated ſeveral *acid ſpirits*, before and after the *Serum was ſeparated from it*.

I have alſo taken the ſeparated *Serum*, and affuſed *ſpirit of Vitriol* to ſome; to others *ſpirits of Harts-horn*, and other *ſpirituous waters*, and I have affuſed to thoſe that had a mixture of the *ſpirit of Harts-horn* ſome *acid ſpirits*, and other liquors to ſee the *changes*.

I ſhall not now ſet down the ſeveral *Phænomena*, and obſervations I made, not having leiſure to digeſt them all, nor being willing to diſmember a diſcourſe I intend about the nature of *blood* and *Phlebotomy*, in which I ſhall not only treat of all theſe things, but adde many other obſervations, from the *burning of blood*, and the *Serum*, which any man may do, without *feeling* any thing by *ſympathy*, notwithſtanding the *whimſeys* of *Helmont*, and that great *Virtuoſo* Sir *Kenelme Digby*. I have done it fourty times in *Men*, *Women*, and *Children*, to obſerve thoſe varieties in *blood*, which never entred into the heads of our *Experimentators* Though Dr. *Walter Needham*, my learned *School-fellow*, a Member of the Society, deny that blood will burn, *Carbonibus injectus ſanguis flammam non facile concipit, ſed potius torretur in grumum*. Yet if any one pleaſe but to take a piece of the *coagulated Maſs* of blood, and lay it on a *Fire ſhovell*, and ſo place it in an hot fire, that the *coales arch* round *about it*, but *touch it not*: after he hath obſerved the great variety of its *intumeſcence*, and the *crackling* of *divers ſalts*, as it were *decrepitating*, it will take flame commonly when *dry*, and *burn* with a *great variety* of *Phænomena*: ſome will not *flame* at all, though brought to *ignition*: there will be alſo *variety* in the remaining *Cinis*, as to its *ſaltneſs*. In the like manner ſet the *Serum* to coagulate on the *coals*, and then *burn it*. I have alſo burned the *blood* and *Serum*, after it hath been mixed with *acid liquors*. By *this trial* will appear more then can be imagined as to the differences of the blood of *Animals*, and of *young* and *old Animals*, I will endeavour to finiſh that Tractate, wherein there will be *obſervations* about the colour of *blood*, and *melancholique*, and *pituitous*,

Diſquiſit. de ſœtu. pag. 130.

pituitous, and *crimſon* parts; and a certain *pellicle* which generates by the *Air* on the top of moſt blood, if it ſtand 24 houres; which ſometimes is as firme as thoſe *tunicles* that encompaſs the *Liver*, or *Kidneys*. Obſervations upon *that*, and upon the *turning* of the *coagulated Maſs*, and its becoming red *again*, though not ſo *floridly*. Trials upon that in *veſſels cover'd*, that it is not from the *air*, in oppoſition to the *Fracaſſati*.

I will not mention any thing hereof now, but having imparted ſome obſervations to ſome, and knowing what *plagiaries* ſome men are, I thought fitting to publiſh *thus much*, that *they might* not pretend to the *inventions*, each whereof were enough to make one of *them proud*, and fill the *Tranſactions*. Yet I will ſay this, That I never had put my ſelf upon theſe *trials*, but out of *envy* and *indignation* againſt *them*, and the *Transfuſion of blood*, about which they made ſuch ado every where. I ſhall promiſe one thing, that Mr. *Boyle* is very much miſtaken in, imagining that there is a great difference betwixt the effects of *Medicaments*, when mixed with the warm blood of an Animal *out* of the *veins* and *in them*, as will appear by the mixture of *milk* already ſpecified, and that of the *Salt of Tartar*, which will follow out of the Letter of *Borrichius*.

Experiments *upon the mixture of* Liquors, *with the* warm blood *of* Animals, *taken out by* Phlebotomy.

1. By putting into the *warm blood*, as it came from *Animals*, a little *Aqua fortis*, or *Oyle of Vitriol*, or *ſpirit of Salt*, (theſe being the moſt uſual and acid *menſtruums*) Mr. *Boyle* obſerved, that the *blood* not only would preſently loſe its pure colour, and become of a *dirty* one, but in a trice alſo be coagulated; whereas ſome, if fine *urinous ſpirit*, ſuch as the *ſpirit of Sal Armoniack*, were mingled with the *warm blood*, it would not only not curdle it, or imbaſe its colour, but make it look rather *more florid* then before, and both keep it *fluid*, and preſerve it from *putrefaction* for a long time. Tranſact. numb. 29. p. 552.

Tho. Bartholin. ep. Centur. 3 ep. 97. pag. 421, 422

2. The *Learned* and *Inquisitive* Man *Olaus Borrichius*, having cut up a dog alive, made these *observations*. He took five *glasses*, and placed them in order, putting into the one *spirit of vinegar*, into another *oyl of Tartar per deliquium*, into a third a Solution of *Allom*, into a fourth spirit of *Salt Armoniack*, into a fifth *spirit of wine*; into each of the Glasses, he suffered the blood of the *Crural Artery* to run. After some time he come to look upon his *Glasses*, but the next day the *observation* was most perspicuous. That Glass which had the *spirit of vinegar* in it, it was become *black* like to the blood of *Melancholique persons*, with a thick and copious *black sediment*, and that liquor which was on the top, was *blackish*.

Where the *Oyl of Tartar* was, the colour was pretty *florid*, but the liquor more *turbid*, no sediment at all, only some *filements*, like little *fibres* floated in it conspicuously, here and there.

Where the *Solution of Allom* was, there all seemed like a *subcineritious* or dirty-coloured putrilage, there being no reliques of the *crimson* colour of blood to be seen.

Where the *spirit of wine* was, there the liquor was more *turbid* then that which had the *Oyl of Tartar* in it.

Where the *spirit of salt Armoniack* was, that was of the most *beautiful colour* of all, being very *florid*, of a thin consistence, with a diaphanous sediment like to the *gelly of currants*.

This observation he also tells *Bartholinus*, that *he* had in like manner made the *preceding Summer*.

Out of *all which* it most evidently appears how *nice* a thing the *blood* is, and how *small mixtures* alter the *colour* and *texture* of it: and what *consequences* may follow upon such alteration of its *consistence*, and *particular texture*, no man knows; but that they may be very *bad* (even where *innocent*, and wholesom *Medicaments* are *affused*) is *evident* out of what *I* have set down.

Inspeximus post intervallum & plenius postridie omnia: Observavimus *sanguinem*, cui affusus erat *spiritus aceti*, redditum *nigricantem* instar sanguinis Melancholicorum, sedimento crasso, copioso, atro, supernatantem liquorem, pæne etiam *atrum*. Cui affusum *oleum salis tartari*, redditum coloris sic satis *floridi*, sed turbidiorem liquorem, sedimentum nullum, ramenta tantum fibrillarum instar hinc inde conspicua. Cui affusa *solutio aluminis*, redditum instar putidæ & subcineritiæ putrilaginis, omni sanguinis colore prorsus abolito. Cui affusus *spiritus vini*, redditum turbidiorem, quam cui *oleum salis tartari*. Cui *spiritus salis Armoniaci*, redditum omnium elegantissimum, colore floridum, tenuem substantia, infundo sedimentum diaphanum instar Galatinæ ribium.

It

It is alſo as manifeſt, that there are in the bodies of *men* and *women ſolutions* or *liquors* imbued with *ſundry ſalts*, as *aluminous, acid*, and *vitriolate, &c.* which when *they* ſhall mix with the *injected blood*, what the *iſſue* may be, *I* leave the Prudent to *conjecture*. Certain it is, that for *theſe conſiderations* ſpecified (reſerving my own Experiments to my ſelf) none but inconſiderate *Quackſalvers* would put a *Patient* upon the *trial* of *injecting of Medicaments*, or *transfuſing of blood*. It is a courſe *Nature* (whoſe *Servants* and *Imitators Phyſicians* hitherto *were*) never prompted us unto: Having taken ſo many courſes whereby *blood* might at any time of *need* iſſue out of the *veins* and *arteries* in ſundry parts of the body: But eſpecially provided that nothing might *immediately* come into the veins. Whatever comes into the veins by the *Stomach*, ſuffers a great alteration firſt, and whatſoever is *noxious*, either ſeparates from it there and in the guts, or is *mortified*, or *mitigated* ſo as to be *innocent*, and *agreeable* to the nature of the *veins*. Which particular nature of the *ſanguiferous veſſels*, is that which in the *dead* keeps its own *blood fluid*, and in the *living* contributes ſo much to the *motion* of it, that if you make a *ſtop* and *intercept* the impulſe of the *ſubſequent blood*, yet will the other *continue its courſe*. But what will the effect be of *Heterogeneous* blood? For undoubtedly the nature of the *veins* is agreeable to the *blood*, and communicates its *impurities* and *vertue*, as the *cask* doth to the *wine*. But further, ſince the blood is to paſs through the *poroſities* of the *Liver* and *Lungs*, and capillary *veins* and *arteries*, how will *they* agree with the *new blood*. (it being evident upon mixture of *Liquors*, and upon *burning*, that there is a difference in the *fibroſity* of the *bloods*, and conſiſtence of the ſeveral *Serums*) or how will that *circulate* which reſults from the *mixture*, I know not, but certain it is, that the *ill conſequence* is *almoſt*, if not *abſolutely paſt remedy*.

Vide ep. *Walæi* de motu ſangu.

In fine, what is it that is aimed at in this *Tranſufion*? is it the *rectifying* the *maſs* of *blood* (ſuppoſe *ſeventeen pound* in a body) with the affuſion of a *few ounces*, or a pound of *Lambs blood*?

They

They may as ſoon rectifie as much *vinegar*, or decayed *wine*, with the like proportion of *good wine*? would they amend the *impurities of the veſſels*? there is the ſame difficulty as before. That which they *transfuſe* is not a *Chymical ſpirit*, but an *impure*, and *heterogeneous* mixture, fitted by different *digeſtions* and *ferments* to a *different nouriſhment* of *another Animal*, with *different excrements* reſulting from it. It is in the *Stomach* and *firſt digeſtion* where food is ſo concocted by the *Humane heat*, or *Acidity*, as to turn to a *chyle* adequate to the *nouriſhment of man*, and generating ſuch blood, and ſuch excrements, as are the reſult of ſuch a concoction as is *agreeable to the nature of man*. And ſo it is in all creatures: Thus we ſee, that in *different Animals* different *Excrements* are generated, nor is it to be doubted but that the *concoctive* principle differs as much in a *dog*, or *cat*, as do thoſe *excrements* which differ much from thoſe of *men*, though both eat the ſame meat. *Sicut* acidus ſpiritus *quilibet animam inſeparabiliter in ventre ſuo portat, atque in illud corpus, cui infunditur, dominium ſuſcipit, illudque confeſtim juxta ſui naturam format*: *hinc* ſpiritus ſalis *in* Alcali Tartari *fuſus ſtatim ſibi format corpus ſalinum propriæ naturæ conſentaneum*, & fit ſal: & aceti ſpiritus, vel acetum diſtillatum *in eodem* Alcali tartari *ſibi format corpus adæquatum ſuæ propriæ naturæ*, & fit tartarus vini, *& ſic* de vitriolo, *& reliquis* acidis: *Ita quoque* acidum Stomachi humani, *cum apprehendit panem, vel quicquam alibile, in quod dominari poſſit, illud convertit & commutat in* chylum, *& exinde* in carnem humanam: *& eundem panem* Acidum Stomachi canini *convertit & tranſmutat in* carnem caninam: *uti & de reliquis viventibus quotidie docemur, eo quod natura in omnibus iiſdem inſtrumentis operatur*. If the Caſe be ſuch, and that the blood transfuſed hath received thoſe *impregnations of vitality* which are agreeable to the nature of the *Animal* whence it is *transfuſed*, and is qualified to generate ſuch *nouriſhment*, and ſuch *excrements* as are the conſequences of thoſe *digeſtive characters* (if I may ſo call *them*) and *impreſſions*; How can we imagine that ſuch blood being immediately transfuſed into

Otto Tachenius Hippocr. med. clavis c. 9 p. 201.

our

our veins, without thoſe *previous alimental ſigillations* and *digeſtions,* produce thoſe *effects* which are to be expected in *humane bodies,* and are (though *irrationally*) in *this caſe* wiſhed for.

But perhaps they think to atchieve their deſign, by introducing a new texture in the *vitiated blood,* and *veſſels,* or *fermentation,* whereupon ſhould enſue the amendment. I perceive indeed by *their ſtories* a *new fermentation,* that the *dogs piſs blood* (no *deſirable* or *trivial* accident!) But what a little time is there for the blood to paſs unto the *heart,* and mix with thoſe *other Liquors*, and *aſcending blood,* and ſo to paſs into the *Heart* and *Lungs?* How do they know that the *blood* they transfuſe is *good?* Upon *burning* they ſhall finde a difference in *blood of beaſts*; and a *different taſte* and *coagulation* in the *Serum.* Beſides, that the blood of *young Animals* is generally leſs *balſamical* and *inflammable,* of another *texture* and *colour,* the *Serum* very *ſaline*; and in a word, exceeding different from what is in *men* and *women* of years. And in the *blood* of *men* and *women,* there are often defects not to be perceived but by *coagulating* and burning of the *Serum* and *blood.* I have taken the *Serum* of a *Maid* ſeemingly healthful, only pained at *Stomach,* and *abounding in blood,* it *coagulated* and looked *like tallow,* and would not burn at all, and ſmelt *noiſomely* after coagulation, not before. I have ſeveral *ſtrange inſtances* of this kind. If there be ſuch indiſcernable cauſes of *diſtempers,* and mixtures in blood of perſons that are not *well,* if they neither know what they aim at in transfuſing in, nor what they *transfuſe,* Let Mr. *Glanvill* talk of *great Advantages to be expected,* and let them *try* it for me. Sure I am that the *Tranſactions* report an *Untruth,* in ſaying that *Coga* was ever the *better* for it: I am told his *Arm* was ſtrangely ill after it, and difficultly cured: and if all the *great likelihood of Advantages* from *Tranſuſion* that are in their *preſent Proſpect,* ariſe from no *other grounds,* they are very *improbable.* The Parliament of *Paris* have forbid it to be proſecuted but by the allowance of the *Pariſian Faculty of Phyſicians.* A

I had an intention to have ſet down at large all the *Stories* relating to the *Tranſfuſion of blood,* with remarks *upon them:* but I was ſo much preſſ.d to *conclude,* and had ſo little leiſure to diſpatch it in that manner at *that time,* that the Reader muſt be content with this *brief,* but I think *ſubſtantial* reply to all that hath yet been ſaid.

See the Stories in the *Philoſophical* Tranſactions.

Swediſh

I remember they ſay that it is not expreſſed, how the *Transfuſion* was practiſed upon the Baron *Bond*, nor after how long time it was repeated, when *he died* But this is no excuſe for *them*; for *they* have fixed no *rules* or *circumſtances* whereby to regulate the *operation*, thoſe are to be learned by *frequent Experiments*, and it may be, the death of more *Patients*. Next, it is not to be doubted, but that *He* that did it might act as *cautiouſly* as they, for his *own credit*, and the *credit* of the *trial*, and the quality of the *Perſon*. It concerns them to procure an *Authentick* Narration of the thing, and what appeared upon his being embowelled

Swediſh Baron died upon it: and to argue from the cures of *Madmen*, or from what they ſuffer *without hurt*, is not for a *Phyſician*, but for one that deſerves to be ſent to *Bedlam*: for *mad people* endures a thouſand *ills*, and *ſtrong Phyſick*, ſuch as others *cannot endure*: and if they find any amendment ſometimes by *uncouth means*, it is by *accident*, as it makes them ill, which ſometimes prove their *recovery*.

As for *dogs*, they cannot declare what they ſuffer: but I am in haſte, and refer my Reader to the peruſal of the *Hiſtories* in the *Tranſactions*: in which what I laſt objected, is all confeſſed: and if after all I have ſaid, he find encouragement to try a remedy, that hath ſometimes proved *not unfortunate*, (but is always *raſh*) let *him* do it for *me*.

I am ſatisfied, That the operation carries more of *terror* (and many ſwoon upon bleeding) then a *potion*, or *Galenical Phyſick*; and that the *greateſt part of our diſtempers do not ariſe from the ſcarcity, or malignant tempers, and corruption of our blood*, is as manifeſt as can be; more ariſe from the depraved motion, and *redundancy* of the *blood*, and *ſeroſities* in and *about the brain*, and the *laxity* and *ſtrictneſs* of the *habit* and *pores* of *the body*; and in theſe caſes *Tranſfuſion* is no *remedy*; much leſs in *malignant diſeaſes*, in which to let blood is *often mortal*, commonly *dangerous*; and it always muſt be antecedent to *Tranſfuſion*, excepting only the ſcarcity of blood; in which caſe what *ſtrength* is there to *aſſimilate*, or *ferment* with the *new blood*.

As to the *Tranſfuſion of blood* in *Pleuriſies*, the attempt is very *ridiculous*, conſidering what an *Ebullition* and *Inflammation* of the *blood* there is then in the *Lungs*, whither the *tranſfuſed blood immediately* flows: what *extravaſated ſeroſities* do afflict *thoſe parts*? how unfit are they for any *ſeaſonable fermentation*? And in the *Small Pox*, how few are they

they in *England* which allow of *Phlebotomy* in that diſeaſe at all? and how *irrational* muſt that *Tranſfuſion* ſeem, which *diſturbs* and diverts *nature* in her *preſent work*? what *hazard* muſt the *Patient* run amidſt a *Fever*, and that violent *commotion of humors* which afflicts his *head*, *back*, *heart* and *lungs* at that time, ſhould he beſides all other accidents fall into *piſſing of blood*, a *ſymptom* ſo dangerous in *that diſeaſe*, and ſo uſual a conſequent of *this Operation*.

Having diſpatched theſe papers thus far: the length of time ſince they were ſent to *London* to be *tranſcribed*, *peruſed*, and ſeveral *inſertions* made, according as my *memory*, amidſt a conſtant employment, ſuggeſted any thing *new* unto me, and the delay of the *Printing* till *Michaelmaſs-Tearm*, gives me an opportunity to relate ſome Obſervations I made at *Bath*, during my ſtay there this *Summer*: As famous as the *Bathes* are, and of as *general* an uſe as *they are* (there being no better *Remedy* in the world for the *Scurvey* then the *Croſs-Bath* regularly purſued, and as it *might be*, I cannot ſay is *commonly* practiſed) yet have not our *Experimental Philoſophers* made any Inquiries into its *nature* and *qualities*: not a man of them ever ſo much as tried the mixing of ſeveral *liquors* and *ſpirits* with the water: as I did, and found no change upon the mixture of *Acid ſpirits*: but the *urinous* and *volatile ſpirits* of *Sal Armoniack* (drawn the *Leiden*-way) and *Harts-horn* did change the water of the Pump in the *Croſs Bath* (which ariſeth from the *hot Bath*) into a *lacteous colour* and *opacity*, inſomuch that it repreſented an *Almond-milk*, and after a time there *precipitated* to the bottom an *inſipid Magiſtery* reſembling *Burnt Harts-horn* finely powdered: the *precipitated* powder was more copious in the affuſion of the ſpirit of *Sal Armoniack*, then that of *ſpirit of Harts-horn*: and the former in that *mixture* loſt its *urinous ſmell*, (and made no *unpleaſant*, but an *unctuous*, *ſoft*, *emulſion-like* drink) which the other retained.

Not a man of them ever tried whether the ſeveral *Bath-water* would coagulate *milk*: which I tried *firſt*, and found that the *Kings-Bath-water* makes *Poſſet* with a *ſoft curd*, and whitiſh *poſſet-drink*, which will not become *clear*: the *Croſs-*

Bath makes an *hard curd*, a *clean* but *whitiſh-poſſet*-drink: the *Pump-water* of the *Croſs-Bath* (which ariſeth from the neighbouring *hot Bath*) yields an hard curd, a *clear* and *very green poſſet-drink*; which being drunk by a woman that gave ſuck bred a great deal of milk (more then *fennel-poſſet-drink*) and made her break *abundance of winde*, which thoſe uſually do that drink the *Bath-waters*. And I believe this way of giving the *Bath-waters* might be no *ſmall improvement* of *Phyſick*, were thoſe courſes taken *there*, and that *method* which thoſe that underſtand the *ancient* and *modern Bathes*, and waters that are drunk, might eaſily pitch upon: but this is above the reading of our *Comical Wits*.

I could find no grounds to believe there was any *ſulphur*, or *bitumen* in the *Baths*: but rather ſome odd *Alcali* mixed with the *vitriol* of *Iron*: I extracted the *Salts* by *evaporation* of two gallons of the *Croſs-Bath-water*; and having reduced them to three quarts I ſet it to *ſhoot*; but there was no appearance of *ſalt-peter* at all: then I evaporated it to *three-pints*, but ſtill neither *ſalt-peter*, or any other *ſalt* appeared: then *I* evaporated it *quite away*; and then *I* had about two ounces of a *dark-coloured* ſalt, which at firſt reſembled *cream of Tartar* ſomewhat *in taſte*; but having lien longer on the tongue, it reſembled very much the *Vitriolum Mortis*, with ſome more Alcaliſate taſte: *I* performed the *Operation* both in *Iron* and *Glaſs-veſſels* with little difference of the *taſte*, or quantity of *ſalt*: ſome of the ſaid ſalt diſſolving into a *moiſture* in the *air* did eat off the *writing* upon ſuch papers as it fell, and turned the paper *yellow* all over, and rotted it. *I* made a *Lixivium* with the *Croſs-Bath water*, and evaporated *that*, thinking that if there were any unctuous matter in the water, it might hinder the diſcovery of the *Nitre* in its *ſhooting*; but neither could *I* finde any thing of *Nitre* this way: but

Mr. *Ch. Hotham*, when I ſhewed him ſome of the extracted *Salt*, did conceive it to be a mixture of *common Salt*, and *vitriol* of *Iron*.

When I was there, a *Spring* of the *Croſs-Bath* being loſt, they digg'd for it; I taſted the *Earth*, but could finde nothing *nitrous* in it: opening the *gutter* by which that *Bath* empties it ſelf, we found the paſſage cruſted very thick, with a white *lapideous concretion*, *rough* and *unequal* in the ſurface, with ſeveral *cryſtals* fixed in it, reſembling thoſe of *cream* of *Tartar*: to taſte, it was *inſipid*, and of ſubſtance like to what precipitates with *urinous ſpirits* in the water; but after it had lien on the tongue a while, ſome pieces diſcovered a taſte exactly like *cream* of *Tartar*, others an *adſtriction* ſomewhat *vitrioline*. I brought ſome away, and intend to examine it further.

but ſtill there was a taſte of the *Vitriolum Martis* in the ſalt: and one Mr. *Berenclaw* a Practitioner there aſſured me, that he had known the *Bath-water* drunk, and to have tinged the *Excrements* black, but I cannot avow the truth of that.

I inquired about the truth of what Dr. *Mearn* had writ about the *Stone* he took up, upon *Lands-down*, which being infuſed in *water* produced a reſembling heat and taſte to what is in the Bath: But Dr. *Maplet*, an inquiſitive and learned Phyſician there, who was with Dr. *Mearn* then, and had ſome of the *mineral* ſtone, aſſured me it was a *lime-ſtone*: ſo did Mr. *Chapman* an obſerving *Apothecary* there, who likewiſe ſaw the *Stone*, and taſted the *infuſion*. In fine, where Dr. *Mearn* took up that *Stone*, any man may take up a *thouſand*, they not being caſt out of the *Earth*, but dropped out of the *lime-carts* which paſs that way into *Bathe*, the *Kills* being thereabouts.

The ſtones in the bottom of the *Croſs-Bath*, many are of *reddiſh ruſty* colour, others *green*: but concerning the Bathe, I may next *Summer*, during my ſtay there, in the midſt of *June* and *July* (if God give me *life* and health) make a further Narrative: I only mention this to prevent the *Virtuoſi* from uſurping upon *my diſcoveries* and *intendments*. Yet to do them ſome *juſtice*, I was told that in ſome of their *Tranſactions*, they have this obſervation about *Bathe*, that *if any perſon that is drunk go in there, the Bath will make him ſober: If any that is in the Bath drink freely there, it will cauſe him to be preſently drunk, with leſs drink by far then if he were out of it.* This report is *worthy* of our *Philoſophers*, and advanceth their *intelligence* above the credit that *Ariſtotle* and his *Hunters* deſerve. The firſt part is *defective*, for it ſhould have been added, that the *drunk perſon muſt ſit ſtill, and ſweat ſoundly: if he ſtir up and down or ſwim*, he ſhall be *more ſick* then if he had never come in. The ſecond part is *notoriouſly falſe*, and all the *Bath-Guides* and others that have tried it, avow, that 'tis uſual for the Townſmen to ſit ſome hours and drink in the *Parlour* of the *Queens-Bath*, and never be drunk: and they ſay, a man that *ſweats there* ſhall *bear much more drink*, then if he were out of the *Bath*: which I thought *rational* and agreeable to what I had obſerv'd in the *Indies*, where men *ſweat* and have more drink then in *England*, and *ſtronger*.

But I come now to that Caſe, for which I adde this *Diſcourſe*, and that is, Obſervations upon the mixture of the *Bath-water* and other *Liquors* with *blood*, and the *Phænomena* thereupon, which, though I might reſerve for that other diſcourſe of mine about *Phlebotomy*, yet I will oblige my *Reader* with ſome of thoſe *Curioſities* here, eſpecially ſince it will give him occaſion to reflect how facile it is to multiply *ſuch Experiments*, and how negligent *they* are who pretend to be the grand *Obſervators of this Age*.

When I went to make uſe of the *Bath*, amongſt other *Preparatives* thereto (which are better taken upon the *place*, then at a *diſtance*) I cauſed my ſelf to be let *blood*, and being willing *to improve that occaſion* as well for my *inſtruction*, as *health*, I cauſed ſeveral *Venice-Glaſſes* to be filled with *ſeveral liquors*, each liquor amounting to ſome *three ounces*, and into each glaſs I ſuffered to run as much as half an ounce of blood, or *little more*; taking no other meaſure, then that the whole liquor ſeemed of a deep *blood red*. The *Phænomena* thereupon were theſe enſuing, being obſerved preſently after I had bound up my arm, and was in condition to write.

1. That *Glaſs* which contained the ſpirit of *Sal Armoniack* (drawn the *Leiden*-way) kept of an *equal conſiſtence* from top to bottom, being of a deep red, and not *tranſparent*, like *Tent-wine*.

2. Into two ſeveral Glaſſes I had diſſolved the *Salts* of *Aſh* and *Wormwood*, half a dram in three ounces of water; the ſolutions of theſe *two Salts* ſhewed no difference at all; the top, after ſome ſpace, was of a *florid red*, (ſuch as is viſible in *watriſh* blood) for about a quarter of an inch: the bottom was of a more dark red, and reſembled *Tent-wine*.

3. A foutth Glaſs held *Oleum Tartari per deliquium*: the *blood* and that *liquor* did not firſt mix, but were as *two diſtinct liquors*, notwithſtanding that the *blood* had ſtreamed into the *Glaſs*: After a while the *blood* and *oyle* mixed together, and it all became of a deep red from top to bottom; the ſurface only was *tranſparent*, and of a *brighter red*, as that of the other *Alcaliſate Liquors*, but not ſo far downwards: the reſt was as *Tent-wine*.

4. I

4. I dissolved half a dram of *Allom* in three ounces of water, and upon bleeding thereupon, all the *crimson of the blood* was immediately destroyed, and it became almost *as black as Ink*: after a little space towards the surface it cleared up: there were certain *bubbles* on the top that continued the *redness*.

5. Another Glass held a quantity of the *Kings-Bath water*, the blood that did stream into it, appeared of a dark red, but transparent, as deep *Bourdeaux* wine shews: a little below the surface it was *deeply red*, not transparent, but like *Tent wine*.

6. The *Cross-Bath* altered little from the *Kings-Bath*, saving that the *transparency* of the *surface* extended it self downwards to a greater profundity then the other.

7. A Solution of half a dram of *Sal prunellæ*, yielded a *blood* on the surface like to that of *Salt* of *Wormwood*, but not to so deep a descent: otherwise it was of the colour and consistence of *Tent wine*.

After they had stood in the window about five houres, I returned and observed these *Phænomena*.

1. That with the *spirit of Sal Armoniack* continued like *Tent-wine*, only the uppermost part of it to the thickness of a *barley-corn*, was *diaphanous* as deep *Bourdeaux*-wine.

2. That with the *Sal prunellæ* coagulated into a *Mass*, shrunk from the sides of the *Glass*, and sunk to the *bottom*, leaving them super-natant water of a *pale citrine* colour; the *Mass* it self being of a *florid red* on the surface, and of a *deep red*, not *blackish*, to the bottom, that I could perceive.

3. That with the *Cross-Bath water* changed not, but seemed thick as *Tent-wine*, the upper part being diaphanous, and like deep *Bourdeaux*-wine?

4. That with the *Kings-Bath water* changed not; only the *diaphanous surface* extended not it self downwards so far as the other Bath-water did.

5. The *Solution of Allom* continued all fluid and black; no *coagulated mass* therein: but the *bubbles* had lost

their

their *crimson-colour*, and were become *cineritious*.

6. That with the *Salt of Wormwood* resembled deep *Bourdeaux* wine, but was less *diaphanous* a little below the surface: The *surface* extended downwards to the length of a *barley-corn* with a perfect *transparency*.

7. That wherein was the *Sal fraxini* was *diaphanous* to the bottom; no innatant *filaments* or *coagulated* mass in it: But the surface to the length of a barley-corn was like decayed *Claret* made with a mixture of white and red wine: the residue was deeper like that of *Bourdeaux*.

8. That with the *oleum Tartari per deliquium* was *diaphanous* to the length of a *barley-corn*, and of the colour of *Bourdeaux* wine: the lower part un-coagulated, and like *Tent-wine*.

9. It is to be noted, that the reflexion of the Glasses in all the *Liquors*, they being held up to the light, (except the spirit of *Sal Armoniack*)did create a *corona* of several colours, mixt with *green*, *blew*, and so as not one resembled the other. That with the *oleum Tartari per deliquium* resembled the *blew* in *Bourdeaux* wine, with an *eye of green*.

I had forgot to relate how *I* kept some of the blood in a separate *Pottinger*; and it seemed excellently well-coloured; when it coagulated, the top was of a due *red*, the bottom *blackish red*; the *serum* of a due *transparency* and *proportion*, and not tinged to *citrine colour*: and coagulated all as the *white of an egge* over a gentle fire.

I poured also upon the blood in two other *Pottingers*;upon the one *spirit of Harts-horn*; on the other spirit of *Sal Armoniack*, but not much: perhaps a dram or more: that with the *spirit of Harts-horn* at first seemed more florid,then that with the *spirit of Sal Armoniack*: both coagulated into Masses after a while, and were then both of *one colour* on the surface: but that with the *spirit of Sal Armoniack* coagulated its Mass so as to break from the sides: that with the *spirit of Harts-horn* did not break from the *sides*; whether the blood of one, and the other might differ, *I* know not; but both *immediately* followed one the other. That *blood* which had nothing *mixed with it*, after coagulation, differed

fered not from the other two, though they were covered over with the *ſpirits* as ſoon as they were taken, and that expoſed only to the *Air*.

After a while upon the *ſurface* of that with the *Kings-Bath-water*, there was a kind of fatty *cremor* which covered the whole *ſurface*; and ſo on that with the *Queens-Bath-water*: the others had none at all.

On *Munday* after dinner, the next day after I had bled, I came to obſerve again; and found,

1. That with the *Sal fraxini* to be more and more diaphanous, reſembling *Bourdeaux* wine: that with the *Sal abſcynthii* leſs *diaphanous*, but red ſtill.

2. I obſerved the *Solution of Allom*, and however it looked black, yet being held in a clear light, one might diſcover in it viſible appearances of a *deep red*. *I* poured on it ſome ſpirit of *Sal Armoniack*, to ſee if it would reſtore the *colour*: but in ſtead of that the *liquor* coagulated preſently into little *maſſulæ* or flakes, reſembling raw fleſh when the *blood* is waſhed out.

3. There was no alteration in that with the *ſpirit of Sal Armoniack*.

4. That with the *Queens-Bath-water* continued *more diaphanouſly* red towards the top: but that with the *Kings-Bath-water*, did not loſe its *redneſs*, though it were not diaphanous near the ſurface.

5. Of the two Pottingers in which were *the ſpirits of Harts-horn*, and *Sal Armoniack*, though both were coagulated, yet that with the *ſpirit of Sal Armoniack* was the moſt *florid*.

6. That with the *Oleum Tartari per deliquium* continued red, but loſt its *diaphaneity* at the top almoſt quite.

7. That with the *Sal prunellæ* after the coagulated *Maſs* had ſubſided, had on the top of it in the middle of the *Glaſs*, to the bredth of *ſix-pence*, a concrete *gelly*, exactly reſembling that of the cleareſt *Harts-horn*, not boyled up to its greateſt heighth; from

from hence protended certain filaments, with which it was faſtned to the *maſs of blood*, which was *buoyed* up thereby, ſo that it touched not the bottom.; the *jelly* was *inſipid* and ſtuck to my finger, when I touched it: whether that little which did ſo adhere took off from the *equipollency* of the two bodies; or whether I broke caſually ſome of the protended filaments, or from what other cauſe I know not; but after a while the Maſs ſunk quite to the bottom, and drew the *gelatine* below the ſurface of the water.

8. Upon the pouring out of the blood, that with the *Queens-Bath water* happened to ſeem of a *pure Claret*, like *Bourdeaux* wine, no *ſetling*, or *floating filaments*, but *ſomething red*, which reſembled exactly the flying Lee in botled *Claret*.

9. That of the *Kings-Bath-water* appeared as the former, only at the latter end, as it was poured out, there was a certain *gelutine* mixed with it, and ſticking to the ſides, that for *colour* and *conſiſtence* exactly reſembled the *jelly* of red currants.

10. That with the *ſpirit of Sal Armoniack* upon effuſion, appeared like deep *Bourdeaux* wine, and ſo from top to bottom *without any alteration*.

11. Upon the effuſion of that with the *ſalt of Wormwood*, it appeared alſo like to *Bourdeaux* wine; but towards the bottom there was *Gelatine* red, like that of *red currants*, more tenacious and in greater quantity then was in that *mixture* with the *Kings-Bath-water*.

12. That with the *ſal fraxini* poured out like *common* or *leſs deep Claret*: at the bottom there was no *Gelatine*, but it ran a *little thicker* like to *Tent wine*.

13. That with the *Oleum Tartari per deliquium*, upon its firſt effuſion ran like *Claret* a little *decayed*: but the *moſt of it* dropped, as if it were a weak *Gelatine*, and ſo continued to the laſt, being almoſt of as *deep colour* as a ripe *Mulberry*; I poured upon ſome of the ſaid *jelly* almoſt as much of the *ſpirit of Sal Armoniack*, and it immediately diſſolved all the *jelly*, and made it *fluid*, yet ſo as that the *bloody craſſament* appeared *unequally mixed*, ſome parts being more *deep* and *opacous* then others.

14. I took the Pottinger in which was the *blood* with the *ſpirit of Harts-horn* affuſed to it, having ſeparated the *maſs* from the *ſides* of it, I poured out the *Serum*, which was as *black* as *common Ink*: the *ſurface* was *red*, but not ſo *florid* as that with the affuſed *ſpirit of Sal Armoniack*: moſt of the *melancholy blood* ſeemed diſſolved into that black *Serum*, the ſuper-incumbent *maſs* being *thin*.

15. That *blood* on which the *ſpirit of Sal Armoniack* was poured in the Pottinger, appeared from top to bottom *red*, only in the bottom there were ſome little ſpots of a *blackiſh* and *darker red* then the other parts: on the ſurface there was a *Gelatinous pellicle* generated: the *Serum* was of a *citrine colour*: the *conſiſtence* of the *coagulated maſs of blood* here was more *tenacious* and *fibrous* then in that other Pottinger with the affuſed *ſpirit of Harts-horn*: There was no *pellicle* diſcoverable upon that with the *ſpirit of Harts-horn*; upon that with the *ſpirit of Sal Armoniack* ſo tough an one, that it would bear up a little way in your hand the whole *maſs of blood* adhering to it.

16. The *blood* which was kept in a Pottinger *without any mixture*, being placed in an *arched fire* on a fire-ſhovel burned with a *bright* and *continued flame*, as if it had been *Turpentine*, but crackled like a green *bay-leaf* caſt into the fire: and ſo it did being caſt *immediately into the fire*, but the *crackling* was leſs *durable*, by reaſon of the *vivid fire* into which it was caſt. It is to be noted that this pottinger having been removed into the *Sunne*, all the *Serum* was *exhaled* or *incorporated* into the *maſs*, which was grown to the bottom of the Pottinger, and dried there, ſo that I ſcraped it off: whether that might adde to the *Phænomena* I know not.

17. The *blood* in that Pottinger where the *ſpirit of Harts-horn* was affuſed, being taken out and placed in an arched fire, roſe up with an *equal intumeſcence*, as a *cake* doth in an *Oven*; it *crackled* much leſs then the *unmixed maſs of blood*: It burned *ſlowly*, with a *continual* but not *vivid* flame, and in ſuch a manner as if the *maſs* had never *taken fire*, but only the *ſmoke* iſſuing from it; for one might eaſily ſee an *interſtice* betwixt the *maſs* and *hovering flame* all the

while, till it came to a perfect *Ignition*.

18. The mass which had *spirit of Sal Armoniack* affused unto it, being placed in an arched fire, did rise with an *equal intumescence*, but greater then that with the *spirit of Harts-horn*: it *crackled* less then that with *spirit of Harts-horn*: the *flame* at first resembled that of the other; afterwards instead of *hovering* about, it seemed to issue *immediately* from the *blood*, and not to appear like a *smoke* that took fire within the *arch*; the *flame* then was *vivid*, and *continued*.

19. The fire being an exceeding *quick fire*, I poured some of the serous blood that was in the Pottinger, impregnated with the affusion of the *spirit of Sal Armoniack*, and as it *dried* it took fire *presently*, the flame resembled that of the former *mass*, only it wasted *faster then that*, being cast upon so *quick* a fire: The *black Serum* of the coagulated *mass* with affused *spirit of Harts-horn*, though cast into the *same fire*, would scarce *burn at all*.

20. I took some of the *mass* that was impregnated with the *Sal prunellæ*, and placed it in an arched fire (the *Serum* or Solution poured off from it was *insipid*) it rose with an *unequal intumescence* copling, like a *loaf*, in the midst: I brought it to a perfect *ignition* and *coale*, yet did it not *crackle* at all, neither *burn* till the last, and then but a *little*, and with an *interrupted flame* which seised now *on this*, now on that part: nay, there was but very little sign of any *Sal prunellæ* in it to *sputter* as it *burned*.

21. I told you how I poured some *spirit of Sal Armoniack*, upon the mixture of *blood and a Solution of Allom*, and of the odd coagulation that hapned thereupon into white *massulæ* which seemed like *flesh* when the *blood is wasted out of it*: I took of those *incoherent flakes* or *massulæ*, and putting them to burn in an *arched fire* upon the *fire-shovell*, it run all off, upon a *great ebullition*, into the *fire*: I took the red hot *fire-shovell*, and placed some more upon it, which seemed to burn as *Allom* doth in the like case, and so stayed on it: but being put into the *arched fire*, and brought to *ignition*, it would neither *flame*, nor *crackle*, nor left any visible quantity

tity of *coale* or *ashes* behinde it, as if it had almost all *evapo-rated*.

22. These were the *Phænomena* which I had opportunity to take notice of at *that time*: but I also left a *Solution of the Alcali of Nitre* of about three ounces with the Apothecary, if any else came to bleed there in my absence: upon bleeding, an healthy young man that was somewhat indisposed, some was suffered to *stream* into that *Solution*: at first it was of a *florid red*, but paler then *blood* usually is, resembling a *bastard-scarlet*: after some days standing *I* found it of a *deeper red* from top to bottom: one half of it was *transparent* like to the *duller* and more *decayed* sort of *Claret*: the other half seemed like *Tent-wine*, not *diaphanous*: on the *surface* there was a *cremor* which extended it self almost all over it: Upon pouring it out, it appeared *all* to be of a *blood-red*, only that which ran *last* was of a *deeper dye*: at the *bottom* there was a kinde of *Gelatine* like to that of *red Currants*, which rendred the one half of it *opacous*: it was no way dis-*coloured*, nor *unequally mixt*: the *spirit of Sal Armoniack* being poured on it, did render it *fluid* presently and *transparent*.

Having occasion after some weeks stay at the *Bath*, to ride in *extream hot weather* above 200 miles in a few days, and being tired with watching and the journey, and being wet very much with a great shower of rain at my return, I went immediately into the *Cross-Bath* for half an hour, to prevent any inconveniences that might befal me upon such travel: but at my coming out of the *Bath* I felt so violent a defluxion into my *throat*, and the adjacent *Glandules*, that I apprehended some danger of a *Squinancy*, which yet *I* avoided by *bleeding*, *purging*, and other means together, with the use of the *same Bath* after all: when *I* was to bleed, *I* was willing to try some further *Experiments* in *Liquors*, different from the *former*, and the Observations *I* made were these.

1. I cauſed *two veins* to be opened in the *left arm* at once, and received one Pottinger out of the *Mediana*, and the other out of the *Cephalica*: my intent in that was to obſerve (as I had done once before in my ſelf) whether the blood of *two veins* in the ſame arm would yield *different blood*: if *ſo*, then I thought that it might not be indifferent in what *vein* a man *bleeds*, though they all ariſe from one *trunk* of the *vena cava*; and that we might juſtly have regard to thoſe *cautions* of our *obſerving Anceſtors*, not to *bleed* thoſe veins *promiſcuouſly*, but ſome *in one caſe*, and ſome *in another*. I was confirmed in thoſe ſentiments by the *Phænomena* I met with a ſecond time in the *trial*, as other obſervations have ſatisfied me about the doctrine of *revulſion*, and its truth. Having taken one *Pottinger* out of the *Mediana*, and another out of the *Cephalica*, I ſtopped the *Mediane*, and continued to bleed into the *liquors* out of the *Cephalick*. In the firſt, iſſuing out of the *two bloods*, I could finde no *difference* in the *colour* or *conſiſtence*; but after ſtanding three or four houres, that of the *Mediane* had much *leſs* of *Serum* in it: the *Serum* thereof ſeemed *Limpid* in the Pottinger: but that of the *Cephalick* was *citrine-coloured*: that of the *Mediane* ſomewhat of a *volatile ſaline* pungency upon the tongue, different from the *taſte*, which the other *Serum* had, *that* being *very ſalt*: that of the *Mediane* had a *blewiſh Gelatine* gathered upon the top of the *condenſed maſs of blood*; the other had *none*, but was of a florid red on the top. After two days I came to look on *them* again, and upon turning the *coagulated maſs of blood* in the pottinger, that of the *Mediana* had much more of *black* towards the *bottom*, then the other: and alſo a *thinner ſurface* of *red* then that of the *Cephalick*.

2. To carry on the *Experiment* of mixing ſeveral *liquors* with *blood*, I bled into ſome *ounces* of *Aqua mirabilis*, which grew *deep-coloured* almoſt unto the top, which was *tranſparent* and of the colour of *Mant-wine* almoſt: after ſome houres the *Liquor* became of a *bright* beautiful *Claret-colour* almoſt unto the *bottom*, where there was an *opacous*, *dark-red ſetling*, with an *enæorema* of *contexed filaments* pretended

to

to the top. The *Wasps* flocked to *that glass* in great numbers, and drowned themselves in *it*, not medling with any other of the subsequent *glasses*. After two days was little changed, only the beautiful *Claret* was somewhat *darkned*.

3. I bled upon some ounces of *Treacle-water*, which turned as *black* as *Ink* presently, but continued the blood perfectly *fluid*: The *red* was so destroyed, that the *Aluminous* Solution did not equal it; there not being upon *inclination* of the *glass* the least sign of any *incarnadine*; and so it continued for two days, no variation happening.

4. I bled upon some ounces of *Cinnamon-water*, which turned of a *pale red*; if I held up the *glass* to the light, it seemed almost to the *top opacously red* as *Tent-wine*; but, if viewed otherwise it seemed of a *paler red*, approaching to *bastard-scarlet*. After a while it seemed as if all the *blood* were coagulated into one *mass* from *top to bottom*, subsiding a little within the tinged *Cinnamon*-water. Upon *agitation* and stirring with a *knife*, it appeared that the *fibres of the blood* were so destroyed, that this *mass* was no *coherent* thing, but broken into little *massulæ*, or parcels of a *pale red*, such as the *subsiding curds* are in *whey*. After two days I viewed it, and found the *Phænomenon* of the whole Glass to look *cherry-coloured*, but the *incoherent massulæ* were of a *pale red*.

5. I bled into some ounces of *Aqua Bezoarticæ*, that did coagulate with the *blood*, so that it all fell in one *incoherent mass* towards the *bottom*: but whether there hapned to be a greater proportion of *blood* in the glass, or for some *other cause*, the coagulated blood filled almost all the *water*, much beyond what we observed in the *Cinnamon-water*: the consistence of the *one*, and the other *massulæ* were like the *curds* in whey; these were of a *pale red* retaining to *whitishness*; and so it continued two days; the *small quantity* of *water* appearing in it giving no opportunity for further *Observations*.

6. I bled upon some ounces of *Nantes*-Brandy, it gave us a more *tenacious curd* then the former, of a *pale red*: but the *mass* and *liquour* was *opacous* towards the bottom, so as to

appear

appear like *Tent-wine*, in what light ſoever *I* placed it. After two days that of the *Brandy* which was *fluid*, (the *curd* not being anſwerable to the *Aqua Bezoartica*) was of a pretty *florid red*, the *coagulated maſs* was of a *brick colour*.

7. *I* bled upon ſome ounces of *Aniſe ſeed water* drawn from the grounds of beer, it yielded a mixture of a *deep blood red* from top to bottom, ſomewhat tranſparent. The maſs coagulated from top to bottom, the curd was of a deeper red then the others, and of ſuch a tenaciouſneſs as is to be found in the ſoft curd of *poſſets*. After two days it turned *blackiſh*, the *coherent* curd being of a little *lighter red*.

8. My *indiſpoſition*, and other cares permitted me not to proſecute theſe Experiments as *I* did the other: but one curioſity more poſſeſſed me, to put two drams of *ſpirit of Harts-horn* into a pottinger, and to bleed thereupon, to ſee if it would alter the *Phænomenon* from what it is, if the *ſpirit of Harts-horn* be poured on the blood: *I* did ſo, and *I* found *at this time* that it kept *my blood* from coagulating into ſuch *maſſes* as otherwiſe it would, but the blood turned *blackiſhly-red*, and in it there was obſerved a *crimſon gelatine*, which run off the knife as *jelly* of *red currants* would, when beginning to *cool*. After two days it continued *ſtill fluid*, but *blackiſh*. I have ſundry times tried that way of putting *ſpirit of Harts-horn* into the pottinger firſt, and then cauſed them to bleed upon it with this ſucceſs, that immediately it ſpoiles the *red*, giving it a more *dirty colour*, and caſts up a *mucous phlegme*, (ſuch as I never ſaw in any blood upon *other Eſſays*) juſt like what many *ſpit* and *blow out of their noſes* in catarrhs: this covers all the pottinger, without any mixture of blood in it, and would be *white*, but that the *ſubjacent blood* gives it another *muddy colour*. The blood under it was always *fluid*, and unequally mixed with parts of a bright and *blackiſh red*. Whether my *journey*, or diſtemper prevented that *appearance* in my *blood*, *I* know not.

9. I had a Patient there which had unknowingly taken much of *Mercurius dulcis* in pills at *London*, to her

her great prejudice ſeveral ways: and though ſhe had taken *golden-bullets*, and uſed other means to diſcharge her body of that *troubleſome Inmate*, yet found little benefit: At the *Bath* I let her blood, and to try an *Experiment I* caſt a *Guinny* into one of the *middle Pottingers* as ſhe bled: I could obſerve no difference betwixt the blood preceding, and that therein: but in the *afternoon* I came and went to that pottinger which had the moſt *florid* and beſt *coloured blood*, and ſearching *there* found my *gold*, and that ſtained with white *ſpots* from the *Mercury* on the *lower ſide*. Whether the *ſeparation* of the *Mercury*, or ſome other efficacy in the *Gold* (of whoſe power in ſuch caſes I can give good inſtances) cauſed that difference in the *bloods*, *I* cannot tell, having never tried it ſince.

Being not well at Warwick, *by reaſon of a violent defluxion into the* Glandules *of the Throat, I cauſed my ſelf to bleed* Octob. 20.

1. *I* took ſix drams of ſpirit of Harts-horn, not very well rectified, nor clear of colour, and put it into a cryſtal-glaſs; and bled thereupon about half an ounce of blood; it turned of a *dark red* preſently, inclining much to *black*, though, as it *ſtood*, or as it was *held on one ſide*, you might perceive a lighter, but not *florid* red at the ſides. *It* ſeemed *fluid* for two dayes; but as I poured it out it appeared to be very *Gelatinous*, and of colour like that which is become *ſanious*, and degenerated into *blackiſhneſs* with keeping.

2. I bled upon the *ſame liquor of* Salt-peter, about half an ounce of *blood*, upon four ounces of *liquor*, at firſt the blood did turn on the ſurface to a *baſtard-ſcarlet* (which is an effect every thing of Nitre mixt with *blood* ſo produceth) after-

afterwards the whole blood ſunk to the bottom, the upper part being all of *one colour* and *conſiſtence*, ſuch as is obſerved in the *Serum* of the blood ſometimes, when the *ſupernatancy* is whitiſh, and not tranſparent. Being poured from the *blood*, I found that coagulated into a *maſs*, which was all of a very *natural red* all over, only *ſpotted* in many places underneath with *black ſpots*. The *concretion* was ſo brittle, that it would not hang together, nor endure any *light preſſure*, but as it were *melted*, and ſeemed *gelatinous*.

3. I bled upon a *Solution of the Alcali of Nitre*; it appeared upon the firſt mixture like *baſtard-ſcarlet*; then the blood ſunk to the *bottom*, the *top* being *tranſparent*, yet of the colour of *High-countrey-white-wine*: the bottom ſeemed *redder* then that of the *former*; the *limpid* liquor being poured out, ſeemed all *gelatinous*, and had incorporated with it the *ſerous* part of the *blood*: the *red* at the *bottom* was *fluid* and not *tenacious*, but of the conſiſtence that blood is of when it is *hot*, and newly received in a veſſel out of the *veins*.

N.B. After I had poured out the *blood* and *mixtures* out of the ſeveral glaſſes, and that the glaſſes had ſtood a while, *I* obſerved that that of the *raw Liquor of Nitre*, which remained in the bottom, did turn of a moſt beautiful red, as ever *I* ſaw in any thing: but that with the *ſpirit of Hartshorn*, or *Solution of Alcali*, &c. did not vary: after two days all the remains of *blood* in the ſeveral glaſſes turned *blackiſh* and *ſanious*, only that with the *raw liquour* altered not.

4. *I* bled upon the *liquors of Salt-peter which had paſſed the aſhes*, and on that *which had never paſſed the aſhes*: both were of the ſame *blackiſh* and *ſanious colour* (after the *firſt baſtard-ſcarlet* was paſt) both had on the top a certain *cremor*, which being caſt into the *fire* diſcovered it ſelf to be *nitrous*: both of *them*, though they were of ſuch a *dirty red* inclining to *black*, yet were they of *one conſiſtence* from *top to bottom* all *fluid*, nothing *gelatinous*, nor any one part *blacker*, or redder then the other. Which is very much, conſidering the difference of the *two Liquors*.

5. *I* bled upon the *unctuous Mothers of Salt-peter*, which turned at *firſt* to a *baſtard-ſcarlet*: the *blood* did never *mix*

with

with the *Mothers*, nor otherwise ting *their* colour, then as it caſt a ſhadow by its innating on the ſurface of *them*. It *coagulated* on the top of the *Mothers*, being of *colour* all thorough exactly like to *Ocher*: the *concretion* was a quarter of an inch thick, a firm maſs *to ſee* to, like ſo much *bees wax* caſt into a cake: I took it up in one maſs with my knife but trying its *tenaciouſneſs*, I found it as brittle as moſt *ſhort cakes* are. Upon the *ſurface*, there was an appearance of certain *ſtriæ*, which might be *ſaline*. All the blood did not *coagulate* ſo, but underneath there was a quantity which in the glaſs was of *equal dimenſions* with the *other maſs*, it was of the colour of *Oker*, and *fluid*, and would not mix with the *Mothers* at all: I took of the *maſs*, and tried to burn it in an arched fire twice or thrice, it boyled and bubled up upon the fire-ſhovel, like impure *Niter*, and ſo burned with a flaſhing, as if it had been moſt of it *Peter*, it never came to flame as *blood* doth *uſually*; only one blaze as it were always *hovered* over it for a moment or two, not being continued to the body, otherwiſe then by a parcel of *ſmoke* iſſuing out them.

6. I took alſo two pottingers of blood, the *firſt* and the *laſt* of the *blood* I took away: there was no difference in the blood of one and the other; the coagulated maſs well-coloured, of a good *conſiſtence*, leſs of that *black* or *melancholick craſtament* then is commonly found: the *Serum* well-*coloured*, of taſt *briniſh*: I placed it in an *arched fire*, it roſe up with a *globous intumeſcence* (but crackled not ſo much as at *Bathe*; though very much, and like a *bay-leaf*) it burned with a continued, vivid, and laſting flame.

I ſuffered a *pottinger* of the ſame blood with which this laſt *Experiment* was made, to ſtand ten days or more, in which time it was quite dried up into a *hard fryable* maſs, the top of which was almoſt as black as *Ink*, the *bottom* having ſomewhat of a *dark red* in it. I caſt *a piece of it* into a quick *coal-fire*; therein it *crackled* like unto a *bay-leaf*, but burned with a ſhort and *weak flame*. I placed another part of *it* upon a fire-ſhovel in an *arched* and *quick fire*, where it *crackled* as much as the *other* did (and more then that part

of the *same blood* which was burned in the fore-going *Experiment* of blood *newly congealed*, and separated from the *Serum*, which was in this last case dried into the *mass*) and it did burn with a *vivid* and *continued flame* presently. Which accident *I* take notice of, to shew the different *Phænomena* upon the *diverse way of burning the blood*. I took a third portion of the said *congealed* and *firm mass* of *blood*, and put it to some *cold water* in a Glass, and it dissolved most of it *therein*, and tinged the water of as beautiful a *red* as any *claret*, though otherwise the *mass* were *blackish*, and had nothing of *red* but what was in the *extimous* crust of the bottom, which seemed of a most *deep red* inclining to *black*.

I suffered *two* or *three spoonfuls* of *Hogs-blood* to run into a large *Venice*-Glass, in which was halfe a pint of the *Mothers of Peter*; I suffered it to stand some days, and comeing then to *see it*, I observed that the *Mothers* were become *opacous* almost to the *bottom*, on the top was a mass of coagulated blood exactly resembling the colour of *Oker*; it was so firm, that I took it with my *knife* in one *entire piece*, but I found the *top* and *bottom* of the mass (which was pretty *thick*) to be very soft, but not as it were *fibrous*; the middle was more *firm*: I put some of it upon a *fire-shovell* in an *arched* and *quick fire*, when it *boyled* up, and *ran about*, and by its *sputtering* discovered a mixture of *Salt-peter*: but it did not *flame* at all, though I brought it to ignition. Examineing the remaining *Mothers*, I found a *sanguine mixture* to *float in*, and stain the liquor of an *Oker-colour*, and some of it was aggregated into *little masses* or *lumps*, whose particles did not cohere by any *tenacious fibres* (indeed I have not been able to observe any *tenaciously-fibrous coagulations* in the blood of *Hogs* hitherto) but upon the least touch of my *warm hand*, they dissolved or yielded unto the least *pressure*. Out of all which *I* intend to deduce, that *some common Experiments may shew that, which no Chymical Fires give any light unto*. That *there is a great diversity betwixt the blood of other Animals, and that of Men*: because that upon the *same Liquors* they disclose *different Phænomena*; and consequently that the *Transfusion* is a *rash* and *unsafe attempt*.

I ſhall conclude with this *intimation*, that neither is the blood of *ſeveral Animals*, nor the *blood* of the ſame kinde of *Animals* the ſame; but in *taſte* and colour of the *Serum* there will be often a ſenſible difference, and it is rational to think the like of the blood it ſelf: nor do they *burn* or coagulate alike, or with the like *Phænomena*: nor is the blood of the ſame Men always the *ſame*, though he continue within the latitude of *Health*; and in diſeaſes *Epidemical* let two *bleed*, and there ſhall often be no affinity in the colour of their *blood*, or in the *Serum*, the one being *white* and *turbid*, the other *Limpid*, the *Serum* of the third *citrine-coloured*. And if ſo, what *regulations* ſhall we have for this *operation*: ſhall a *transfuſe* he *knows not what*, to correct *he knows not what*, God knows *how*? This may become indeed that ſort of *men*, being the *worſt* and moſt irrational *Empirics* the Sun ever ſhined upon, as I demonſtrate more fully in my Letter to a *Phyſician*, in a Parallel betwixt them and the *ancient Empirics*.

Let them from theſe *Obſervations* draw their *ſophiſtical Concluſions* for and againſt *ſpirit of Harts-horn*; for, and againſt *ſpirit of Sal Armoniack*; againſt *Allom*, and *Treacle-water*, and ſuch like; till *all the world* come to admire them as much as *I*: And that there be a new *Hiſtory* penned to render them as *contemptible* as this *magnifies*, by a *Rhetorick* that hath more of the nature of the *Microſcope*, then of *Truth*.

The other day coming into my *Apothecaries* Shop, and finding one (not otherwiſe very ill) going to *bleed*, I ſent for a bottle of that *Lixivium* of *Salt-peter* which had paſſed the aſhes, and into the firſt *pottinger* which he *bled*, which ſeemed to have little of *crimſon* in it, but a *Serum* of a *dark-blew* colour; I poured a little of it, and it turned *black*, though it continued *fluid*: Into the *third pottinger* which ſeemed better blood, with a *red colour*, *I* poured ſome of the *ſame liquor*, and it improved the *colour*, and kept it from *coagulacion* awhile; what hapned afterwards I had not leiſure to obſerve.

Miſcellaneous Additions by way of Poſtſcript.

WHatever may ſeem to be ſaid from hence in favour of the ſpirit of *Harts-horn*, is not ſo *valid* as may be imagined: for *I* have mixed a little of the Solution of the *Alcali* of *Nitre* (which turned *Syrup* of *Violets* green,

and rendred it leſs *fluid*) upon the *blood* of a *man*, which was *blackiſh*, *wateriſh*, and *ill coloured*, after it began ſomewhat to coagulate, and I brought it to a new *fluidity*, and as *vivid* a red as ever I ſaw: and ſo it continued for 24 hours; at my return after two days, I found the blood in the Pottinger, (by reaſon of the Sun on the window) all coagulated, and become *friable*; but even that it had viſible ſigns of a *remaining redneſs*, which the other blood that had nothing effuſed retained not. *Oyl* of *vitriol* affuſed to the *Serum of blood*, tinged with the *crimſon part*, doth improve the *red* for an *inſtant* or *two*, but then it turns *black* and coagulates into a ſoft maſs, that admits the leaſt impreſſion; the *fibres* being deſtroyed: but yet it burns rather *better*, *brighter*, and *quicker* then otherwiſe; being poured on the ſurface of coagulated blood, on the top whereof was tough *pellicle* generated; it did not eat the *pellicle*, but in one night reduced the Maſs, almoſt to the bottom, into a conſiſtence like to *Bees wax*, which *burnt* well.

In *January* laſt 1669. I had another occaſion to bleed, but though the *Phænomena* of my blood upon the *Mothers of Salt peter* were the ſame as at firſt; yet in the other mixture with *Salt-peter-liquors*, they were not: the *blood* ſeparately taken ſeemed not to differ from the former, only the *Serum* was a little yellower: it did burn as well as *before*, but *crackled* much leſs. At the ſame time I cauſed an old man to be let *blood* for a *catarrh* and pain in his ſhoulder, which he uſed to eaſe with bleeding; the *blood* ſeemed very good and well-coloured; after it had ſtood a while I had the leiſure to view it, and upon one pottinger of coagulated *blood*, I poured twenty drops of ſpirit of *Vitriol*, whereupon immediately all the top turned as white as *milk*, even the *bubbles* which ſeemed of *blood* before: whereupon I took another pottinger, and ſeparated half the *blood* from the *Serum*, and poured on the blood and *Serum* ſom ſpirit of *Vitriol* as before: preſently all the *Serum* became of colour and conſiſtence like milk: the *blood* turned *black*, and hardened into a ſubſtance that cut like *white-waſhed-wax*: the other, at my return, I found of the conſiſtence and colour of a common *cuſtard*. The *vi-*

triolated

triolated Serum would not *flame*: the *vitriolated* blood did burn with a *brisk* but ſhort flame: the *ſimple blood* would ſcarce burn at all, but with an *hovering* and *diſcontinued* flame.

I took alſo ſome of the pure *citrine* Serum of my blood, which taſted not very *ſalt*; I ſet it in the window for ſome time: during the *froſt* it coagulated into a body of the *conſiſtence* of *butter* in the heat of *Summer*: it gathered no *Ice* at all: the *colour* became leſs *citrine*; but ſtill *pellucid*. I ſet it after ſome days to thaw; which it did immediately before the fire, but came not to its former *fluidity*, but like oyle: after that, it coagulated with the warmth *before the fire*, and ſeemed exactly like to boyled *Turpentine*, but that it wanted the ſmell: it would not flame at all (though crackled much, as ſalt) yet I brought it to *ignition*.

I did alſo take ſome *Hogs blood* again, and poured on the *Mothers of Peter*, it mixed not; only after ſome days ſome *filamentary corpuſcles* ſubſided unto the *middle* of the liquor: the colour at firſt was a *pale baſtard-ſcarlet*: but after a day it turned to a *darkiſh red*, and ſo continued many days; and in its primitive fluidity, it ſuffering not any alteration, but being as *fluid* as when it firſt iſſued from the *veins*: it ſtood in the window all the froſt, not changing or freezing at all. No more did another pottinger of *my blood* that was mixed with the *liquor of Peter which had paſt the aſhes*: but that laſt *blood* turned very *blackiſh*.

In fine, notwithſtanding any thing I have done or purpoſed about the *nature of blood*, I do now deſiſt from the Enquiry: the reſult of my thoughts being *this*, that there is a continual variation in the blood upon every diſeaſe, and often without it, during a *ſtate of health*: that the blood of *Individuals* of the ſame kinde differs not only from it ſelf, but in each other individual: that no man can by reaſon of this conſideration know what he would *transfuſe*; nor what it is he would *rectifie*. In a word, that 'tis moſt prndential to inſiſt upon *Experienced Methods* in *Phyſick*, and that all *phancies* about *ſpirit, ſalt, ſulphur*, fermentative fires in the heart, occaſioned by *heterogeneous mixtures*, and the expli-

cations

plications of the operations of *Medicaments* by the *new Philosophers*, either *Chymical* or others, are all *vain*, and cannot be allowed as a *ground of practice*, till justified by *successful trials*; seeing that not only the *suppositions* are false, but whilst the *blood* is *sub diminio animæ*, effects *upon it* are *different* from what when it is separate: and I think *I* may thence *conclude* rationally, that 'tis not conceivable that the fabrick of our bodies is purely *Mechanical*: for the *liquors* would have the same effect *on the blood in the body*, and *without*: which *they* have not.

A REVIEW of the precedent Discourse against Mr. GLANVILL.

AFter *I* had written the present *Discourse*, *I* was so unwilling to give any offence to the world, and so *apprehensive* lest my *just indignation* for the *affront* Mr. *Glanvill* had put upon *my Faculty*, should transport me beyond all *fitting* moderation, that *I* desired a *Friend*, (without further advising *with me*) to blot out whatever he might *in prudence* think equitable; by reason of his great *cautiousness*, as well as thorough that great *haste* and *continual interruptions* wherein the Treatise was penned; *I* finde several passages either omitted totally, or not sufficiently explained; so as that *I* could not acquiesce in the *publication* thereof, without some *few* additions, partly to prevent some *cavills* that might (though *weakly*) be raised against it, and partly to put *every thing* past dispute hereafter; that so *I* might not have any further occasion to write against our *Virtuoso*, nor *his Abettors* have any thing to do but to call in his *Libell* against the *Physicians*, and do some *reasonable justice* to those *he* had so arrogantly and *injuriously* insulted over. *I* desire my *Reader* to pardon me, if *I* have not in some *circumstantial embellishmeats* and *regularity of procedure* answered *his expectation*, since in the *main I* am sure I have *out-done* it.

Whereas *I* charge Mr. *Glanvill* (page 2.) with *not having read the Authors which he mentions.* These words, *Who can chuse but smile, when he reads how* Apuleius *improved the Mathematicks* after *Euclide?* the whole passage should have run thus; *Who can choose but smile* when he reads how *Apuleius* improved *Arithmetick?* All that *Apuleius* did was to to translate *something* about *Arithmetick* into *Latine*, at such time as the *Latines* had no other Numerals then L. M. D. C,

&c.

&c. And by reason of *this performance* of *his* doth *Vossius* give him a place amongst the *Authors*, not *improvers* of *Arithmetick*: and takes notice of *him* as the *first* that ever writ in *Latine* about *that subject*. Upon which account it was *judiciously* done of *Vossius* to mention him there; but Mr. *Glanvill* is grosly mistaken *here* to name *him*, where he treats of such as *advanced useful knowledge*; which a bare *Translation* doth not. It is true, *Vossius* saith of *Apuleius*, *Primus Arithmeticam Latinis literis illustravit*: which words import no more then I say; and 'tis manifest, that what *He* did was but a *Translation* of *Nichomachus*. So *Cassiodorus de mathem. disciplinis. cap. de Arithmetica. Reliquæ disciplinæ indigent Arithmetica disciplina, quam apud Græcos Nicomachos diligenter exposuit.* Hunc primum *Madaurensis Apuleius, deinde magnificus vir Boethius* Latino sermone translatum *Romanis contulit lectitandum.* The same is asserted by *Isidorus Hispalensis.* This might our *Virtuoso* have observed in *Vossius*, when he read *him*: and what *Apuleius* performed is so *meanly* thought of by *Blancanus*, that in his *Chronicles* of *Mathematicians* he affords *him* no place, though he mention the *Arithmetical* work of *Boethius*. The imputation I fix upon Mr. *Glanvill*, for not understanding what the *Authors* he mentions had writ, and about his not having ever *seen* them, is manifest to any man that shall not only trace him by *Vossius*, but consider the *ridiculous characters* he fixeth upon the *Writers* alledged, *viz. Ptolomy* of *Alexandria* made considerable improvements in *Optics*: and *Alhazenus* the *Arabian* is famous for what *he* did in it. From these *Vitellio* drew *his*, and advanced the Science by his *own* wit and *their* helps. * *Stevinus* corrected *Euclid*, *Achazen*, and *Vitellio*, in some *fundamental Propositions* that were mistakes; and in the room substituted considerable inventions of his own. *Roger Bacon* writ *acutely* of *Opticks*. —— Any man will grant, that *he* who gave so lame an

Apuleius Arithmeticam Nicomachi Geraseni Pythagorici Latine transtulit teste Cassiodoro de mathem. disciplin. cap. de Arithm. & Isidoro Hisp. Orig. iij. & Jonst. de script. Hist. phil. l. 3. c. 13. p. 280.

Vossius de scient. Mathem. c. 51. sect. 1.

Vossius de scient. mathem. c. 10. sect. 5. Blancanus Mathem. Chronol. secul. 15

Vossius de scient. Mathem. Mr. Glanvill P. 47, 48, &c.

* *S. Stevinus* both *invented* and writ such in all parts of the *pure* and *practical Mathematicks*, in *Geography*, *Geometry*, *Navigation*, *Mechanicks*, &c. that never did *any one*, no, nor all the *Virtuosi* in *England* or *Europe*, ever *equalled*, or *pursued*: From hence 'tis apparent Mr. *Glanvill*, and his Abettors never read *him*: he was the first *Proposer* I know of, and before my Lord

an account of *these Authors*, never was acquainted with them, nor understood *particularly* what *they writ*, or added of their *own invention*: whether *new theoremes*, or *different* and *new demonstrations* of *old known* truths. Whereas he saith that *Roger Bacon* was accused of *Magick* to Pope *Clement* the fourth, and thereupon imprisoned: but the accusation was founded on nothing but his skill in *Mathematicks*, and the *ignorance* of his *Accusers*.— Assertions of this nature are not so easily passed by, so many *learned* and *judicious persons* having reckoned him in the number of *Magicians*; such are *Joannes Wierus* and other *Dæmonographers*. That the said *Writer* might declaim against *Magick*, or deny the *possibility* of it, and yet *practise* it, is an usual procedure with (*a*) that sort of people: and that his *works* have in them sundry *Propositions* that are *superstitious* and *magical* is granted by *Delcio*; such haply was that which *Franciscus* (*b*) *Picus* says he had read in his book *of the sixth Science*, where he affirms, that *a man may become a Prophet*, and foretel things to come by the means of the Glass *Almucheti*, composed according to the rules of *perspective*, provided he made use of it under a *good constellation*, and had before-hand made his body very even, and put it into a good temper by *Chymistry*.

Bacon, of a *Society* to carry on *Experments* in order to the rectifying *many errours*, and *improving* many *known truths*: an Admirer of the *Ancients*, and their *learning*.

J. *Wierus* de præst. dæm. l. 2. c. 2.

a Vide *Bodin.* in præf. ad dæmonomaniam.

b See *Gabr. Naudæus* his History of *Magick* ch. 17.

As to what I say about *Orontius*, I adde the words of Sir *H. Savile* in his Lectures, *p.*71. *Josephus Scaliger*—— *homo omnium mortaliam*, ne Orontio *quidem excepto*, ἀγεωμετρητότατος.

Whereas I say (*p.*3.) that the *ancient Physicians* did not only *cure cut-fingers*, and invented *Diapalma* and and other *Medicaments* in order thereunto. I adde (what I *know not how* was omitted) that it is notorious how all our *Herbals* and *Druggists* have explained the *nature* and *use* of *Medicaments* according to the *Doctrine* of the *Elements*, and qualities either arising therfrom, or from the *peculiar mixture* of the parts: and whosoever hath acted, or shall proceed according to *those notions* in compliance with the *Ancients*, shall not stand in need of

any *novel Method* from the *Virtuoſi* to ſalve a cut-finger.

What I have ſaid in the *firſt* and *ſecond* ſheet concerning the *Baremeter* (as *they* call it) that it doth not determine *exactly*, neither the *weight* nor *preſſure of the aire, winde,* or *clouds,* is an opinion which the more *I think upon,* the more I am confirmed in; nor do *I* doubt that others will be as *ſcrupulous* as *I* in their *aſſent* to our *dogmatizing Virtuoſo,* when they ſhall ſeriouſly conſider what follows, and accommodate it to the *Elaſticity and gravity* of the *Atmoſphear.*

Firſt, when our *Virtuoſo* ſpeaks of the *Elaſticity of the Air,* he underſtands thereby a body whoſe *conſtituent particles* are of a *peculiar configuration* and *texture,* diſtinct from what can be aſcribed to *earth, water,* or *fire?* "That the *Air near* "*the earth is ſuch an heap of little bodies lying one upon ano-* "*ther, as may be reſembled to a fleece of wooll; for this (to e-* "*mit other likeneſſes betwixt them) conſiſts of many ſlender flex-* "*ible hairs; each of which may indeed like a little Spring, be* "*eaſily bent or rouled up; but will alſo, like a Spring, be ſtill en-* "*deavouring to ſtretch it ſelf out again. For, though both theſe* "*Hairs, and the Aerial corpuſcles to which we like them, do eaſi-* "*ly yield to external preſſures; yet each of them (by vertue of* "*its ſtructure) is endowed with a power* "*or principle of ſelf-dilatation; by ver-* "*tue whereof, though the Hairs may by a* "*mans hand be bent and crowded cloſer* "*together, and into a narrower room then* "*ſuits beſt with the nature of the body:* "*yet whilſt the compreſſion laſts, there is* "*in the fleece they compoſe or endeavour* "*outwards, whereby it continually* "*thruſts againſt the hand that oppoſes its* "*expanſion. And upon the removal of* "*the external preſſure by opening the* "*hand more or leſs, the compreſſed wooll does as it were ſpon-* "*taneouſly expand or diſplay it ſelf towards the recovery of its* "*former looſe and free condition, till the fleece have either re-* "*gain'd its former dimenſions, or at leaſt, approved them as* "*near as the compreſſing hand, (perchance not quite opened) will* "*permit.*

Page 59.

Mr. *Boyle* in his firſt part of Experiments of the Aire: *Experim.* 1.

I deſire my Reader to take notice about the Elaſticity of the Air, that the very names of *Elater* and *Elaſticity* are of a more ancient mention then the being of the *Society*: *Regius* and *Renquelus* uſe the terms: and that as to the *expanſive motion* of the *Air*, 'tis propoſed by ſeveral *Carteſians*, and before them by *Kircher* de magnet. l. 2 part. 1. progymn. 3. See alſo *Merſenn.* and *Schottus*'s mechanic pneumat. *hydraul*: So that the *Society* can pretend to nothing but the ſimilitude of a *fleece of wooll*, and the explicating it by *that way*.

permit.—Against this I except not only that this *ſuppoſition* is far from a *ſenſible Philoſophy*; but that whoſoever would *weigh the Air exactly, and eſtimate the acceſſion of weight which the Air receives from winds, clouds, or vapors* (the thing Mr. *Glanvill* promiſeth us) muſt *weigh the Air* ſingly firſt, and in its *utmoſt degree of expanſion*, otherwiſe he can never tell what its *gravity* is, or what *acceſſional* it receives by its *Elaſticity*, by *exhalations* and different *mixtures*: But this is not done by the *Barometer* (however it be *eſſayed* in the experiment of *Ariſtotle* very *judiciouſly*) but only an imaginary *column* or *Cylinder of Air*, and its preſſure upon the *Mercury* is conſidered: which procedure ſeems to me as *ridiculous*, as if a man ſhould lay a *fleece of wooll*, or any other *body* upon any thing, and there being above that an *incumbent* body of *lead* (or the like) bearing thereon, yet ſhould he proceed to ſay that he weighed the *fleece of wooll* and not the *incumbent lead*: for as yet no diſcoveries have acquainted the world with the nature of that *Æther* which is above the *Atmoſphere*, whether it *gravitate* or *preſs* upon the *ſubjacent Air* (which a very *ſubtile* but *rapid body* may do) nor what effects the *Libration* of the *Moon* and other *Planets* may have by way of *preſſure* upon the *contiguous* bodies, which *preſſure* may be communicated to the *terreſtrial Air*: and without the determination hereof, it is as vain to pretend to *weigh the Air* by this *Barometer*, as to determine of the *weight* of a *board* that preſſeth a *Cheeſe* in the *Vat*, without conſidering the *ſuperincumbent* ſtone. Neither are we informed ſufficiently what the *Figure* of the *Æther* is, whether it make a *convexe* and ſo encompaſs the *Atmoſphear*; or *alſo* be interſperſed with, and *differently move* therein; nor what effects thoſe *motions* and *agitations* of it have upon the *groſſer* corpuſcles of the *Atmoſphere*, (not only in *abating* of their *gravity* ſomtimes, but adding to them a *levitation*: nor is it explicated yet what effects the *corpuſcular rays* of the *fixed Stars* and *Planets* may have *in* or upon the *Atmoſphere*, adding to its *gravity*, (as 'tis juſt to imagine, ſince that eminent *Virtuoſo*, the *Pliny* of our Age for lying, but a *Virtuoſo*! could waſh his *hands* in the *beams* of the *Moon*) or *Elaſticity*,

Thus the *Moon* according to the *Carteſians* by its preſſure upon the *waters*, cauſeth the Tides on *Earth*.

Sir K. D. of Simp p 43. *Charlton* de fulm. nc.

of which thoſe *intercurrent* corpuſcles ſeem not void (though not *Aiery*) which conſtitute *Thunder, Lightning, &c.* or diminiſhing them *both* in order to the *Phænomena*, which occurre daily.

Secondly, it doth not yet *appear* by any thing alledged by our *Experimental Philoſophers*, that *for certain* the Air which encompaſſeth the *Earth* is a *diſtinct* body of a *different ſtructure* from the *Earth* and *Water* that compoſe the *Terraqueous* Globe. *Iſaac Voſſius* doth think the *Air* to be nothing elſe but *watriſh exhalations* drawn up by the *Sunne*. — "*Credimus Aerem eſſe Aquam ſeu humorem dilatatum, ad legem æquilibrii quaquaverſum ſe extendentem.* If it be ſo, it is a *vain ſuppoſition* which attributes ſuch a *ſtructure* to the *Air*, as is repugnant to the *water*: Others there are which make the *Atmoſphere* to be an *aggregate* of *heterogeneous particles* exhaled from this *Globe*, whoſe *ſtructure* muſt be as *diſcrepant* as the *vapours* are: and what a difference there is in them we may gueſs by the *infinite variety* of *Meteors, Rains, Snows, Hail, Winds, Dews, &c.* and their *component corpuſcles*. If this latter be true, (as 'tis probable that it is; at leaſt that there is no more beſides but an intercurrent *Æther* or *materia ſubtilis* of the *Carteſians*) what becomes of this *Elaſticity*, or *preſſure* of this *Springy Air* ſo much talked of?

Iſ. *Voſſ* de motu mar. & vent. c. 21 p. 94.

Aeris elementum juxta *ſacra eloquia* nihil aliud eſt quam *humidi*: quædam perpetuò occuperantis ſubtiliſſimæ & ſpirabilis ſubſtantia. *Kircher*, Iter eſtat. 2 dial. 2. c. 3.

The *Air* ſeems nothing elſe but a kinde of *tincture* or *ſolution* of *terreſtrial* and *aqueous* particles diſſolved into the *Æther*, and agitated by it, juſt as the tincture of *Cochineel* is nothing but ſome finer *diſſoluble* parts of that concrete lick'd up or *diſſolved* by the *fluid* water. Mr. *Hook Microgr obſ. 6. p. 13.* Atmoſphæram *ex halitibus* terreſtribus *& vaporibus* aqueis *actione* Solis *&* reliquorum Aſtrorum *concitari, inter doctos* convenit. *Hanc eandem* Atmoſphæram, *ob* Solis *&* reliquorum Aſtrorum *converſiones* variæ mutari *& atteperari apud eoſdem* indubitatum *eſt*. Scheiner *res vagin l. 4. p. 2. c.* x.

Thirdly, 'tis neceſſary to diſtinguiſh betwixt the *preſſure* and *weight* of *bodies*: for, ſuppoſe were a man *preſſed* under a *bended ſtick*, or other *ſpringy body* compreſſed, he ſhall feel a *great oppreſſion* upon him, and be *kept down* to his great pain, not with the *weight* but *ſpring* of the ſaid *ſtick*, or other *ſpringy body*: and whoſoever by the violence of the *compreſſion* would judge of the weight of the *incumbent* body, would expoſe himſelf to *laughter*.

Fourthly, 'tis poſſible for a body without any *ſpringineſs* or

or *acceſſional gravity*, to preſs downwards above its *weight*: thus a *needle* touched with a *Loadſtone* declines from that line in which it hung parallel to the *Horizon*, without any addition of weight: which is demonſtrable from the variety of its *declination* and *reſtitution*: and 'tis as *indubitable* that ſuch *declination* of it carries with it ſomething of *preſſure*.

Acus omnino parallela horizonti, quæ ſubito atque magneti affricatur, nullo modo fit gravior, tamen deprimitur, perinde ac ſi magnes eſſet acui ſubjectus. Finge nunc aliquem, qui hæc a magnete fieri neſciat, is profectò credet cum *Ariſtotele* acum tendere ad centrum mundi. *Berigard* de *terra*: circulo 6. parr. 3.

Fifthly, we are to conſider the nature of the *Earth*, whether that be a *Magnet*, or no: for if it be *ſuch*, (however the *Magnetiſm* be explained, whether according to the *Carteſian* Hypotheſis, or that of *Berigardus*) inſtead of *weighing the Air*, we deceive our ſelves as *groſly* as if we took the impulſe with which *Iron* runs to the *Loadſtone* for its *weight*: and thus in ſome caſes we ſhall weigh things by *their aſcent*, which is inconſiſtent with the *common notion* of *weighing* things.

Sixthly, to wave the *uneſtabliſhed* notions of *Gravity* and *Lenity*, and to abſtract from all the *preceding conſiderations*, I ſay, that even ſo this opinion of the *Aerial Column preſſing down upon the Mercury* is falſe: ſince in a body ſo *unequally mixed* as the *Air* is often (and it cannot be diſproved that *'tis ever otherwiſe*) it is impoſſible to imagine that the *preſſure* or *gravitation* is by way of a *Column* or *Cylinder*. Imagine the *Experiment* to be tried by *ſix* or more *weights* preſſing at *one time* upon the *Mercury*, would any man *in his wits* ſay, that this *joint preſſure* were *cylindrical*? conſider but the variety of *mixtures* in the *Air*, (and the ſeparate *preſſures* that are *conſequential* thereunto) which the contemplation of the *clouds* will lead us into, and 'tis the ſame thing. Were a man *ſwimming* in that concourſe of water in *Hungary*, where the *unmixed rivers* flow in one *channel*, and his body ſo placed that part of it were in *one ſtream*, and part in *another*,) would you ſay that the *incumbent water* did preſs upon him in a *Column* or *Cylinder*? But to proceed further, if it be true that the ſuperiour part of the *Air* or *Atmoſphere*, which tranſcends the *mountainous aſperities of the Earth*, hath *another motion* or *lation* then that which is more *low*,

(explain

Vide *Galilæum* ſyſtem. coſm dial. 4. pag. 320. edit. in 4to.

(explain it either the *Ariſtotelian* way, or according to *Galilæo*, and agreeably to the *motion of the Earth*) if this be true, (as I take it to be now) how can we determine of the *Gravity* of the *neighbouring Air* by this *Experiment*? and how vain is this notion of a *Cylinder*? for in a *fluid* agitated with *different motions* as the ſubject *Air* is by *repercuſſion* from the *Hills* and *Plains*, (which begets *vibrations* and *undulations* God knows what it ſuffers upon the *generation* and *motions* of *Meteors*; and where the *ſuperior* part hath a *motion* different oftentimes from the *other*, of whoſe *rapidity* we are as uncertain as of its *ſtructure*, and *texture*, (and we ſee that the *rapidity* or *ſwift motion* of an *heavy body* takes it from its *preſſure* and *gravity*) how can any man talk of *Aerial columns*, much leſs pretend to weigh the *Air incumbent*, and to determine *exactly of any acceſſion of weight*, as M. *Glanvill* profeſſeth to do? Beſides, if *heavy bodies* do not *gravitate* in a *ſtreight line*, but deſcribe the *circumference of a Circle*, or ſome *ſuch line*, (as *new Philoſophers* hold in oppoſition to *Ariſtotle*) and if the *Atmoſphere* be to be reckon'd amongſt the *bodies* that *gravitate*, how can we imagine this *gravitation* to be performed by way of a *column* or *cylinder*? Moreover, this *Atmoſphere* can no way be conſidered to preſs *cylindrically*, if we conſider that in every part of it there are continual *exhalations*, and *ſmoke* aſcending through it, ſo that the *weight* of it muſt needs be *abated* by the *aſcent* of thoſe *vapors*: and what we *experiment* here is not the *weight* of the *Air* properly, but the *ſuper-ponderancy* or *over-weight* of it. The *Atmoſphere* ſeems to me conſtantly to reſemble a *Glaſs* in which *water* is poured on *wine*, and the *wine* is aſcending thorough each part of the *water indeterminately*; if it be thus, and that the *aſcending vapours* carry a *great force* with them, (which any man will grant who conſiders the *weight* of the *ſmoke*, in compariſon to what remains of the *wood* and *coal* that is burnt: and who *ſtatically* regards

[a] Vide *Galilæum* de ſyſtem. mundi dial. 2. pag. 119. edit. in 4to. Sectatoribus Copernici opus eſt dicere (quippe qui ponunt orbem magnum circulo ferri) motum *gravis* deorſum eſſe per lineam curvam vel inſtar *quadratricis* Nicomedis, vel *circulari* ut *Galilæus* contendit. *Scipio Claramont.* de univerſ. l. xij. c. 20.

Vide *Sanctorii* medic. ſtatic. Hanc *Aeris* concitationem demonſtrat vel ipſa *ſaliva* ex alto demiſſa, quæ dilaceratur prope terram in quam concitatus aer impingens ad *ſalivam* redit, eamque diſcerpit. *Berigard.* circ. *Piſar.* part. 3. circ. 6. de *terra*.

regards the *ſteams* tranſpiring from our *bodies*: and how that *ſpittle*, which in an *entire body* iſſues from our mouths, deſcends till near the ground it be *diſſipated* and *diſtended*) I cannot imagine how it can be ſaid that we *thus meaſure all the degrees of compreſſion in the Atmoſphere, and eſtimate exactly any acceſſion of weight which the Air receives from winds, clouds, or vapors.* To conclude, if the *Air* do thus preſs upon the *Mercury*, how comes it to paſs that there is no difference when the *Experiment* is tried in a *chamber* (where the incumbent *column* is leſs then *abroad*) and in the *open Air* of the *ſame level*? Why doth it not *preſs up water* (or other *liquors*) in the like *Syphon* to an *heighth* as different as is the *diſproportion* betwixt the *gravity* of *Mercury* and *water*: which I have not heard it doth; yet the proportion betwixt *Mercury* and *water* in *gravity* is 1 €. 1 3¼. In fine, how is that true which Mr. *Hooke* ſaith, *viz.*

Why doth not this *Cylinder* of *Air* which ſo preſſeth upon the *Mercury*, depreſs a *leaf* of *Gold*, but ſuffers it to flie up and down?

" That *he contrived an inſtrument to ſhew all the minute-varia-*
" *tions* in the preſſure of the Air: *by which he conſtantly found,*
"*that before and during the time of* rainy weather, *the preſſure*
" *of the Air* is leſs, *and in* dry weather, *but eſpecially when an*
" Eaſtern winde, (*which having paſt over vaſt tracts of Land,*
" *is heavy with* earthy *particles*) *blows, it is* much more:
"*though theſe changes are varied according to very odd Laws.*

Mr. *Hooke* in the Preface to his *Micrography.*

If this be true, (as I am apt to believe it is) with what face can our *Virtuoſo* tell us, " *It* is concluded, that ſuch a *Cylin-* Page 61.
" *der* of the *Air* as *preſſes* upon the *Mercury* in the *veſſel*, is
" of *equal weight* to about 29 *digits* of that *ponderous body* in
" the *Tube*. Thus it is when the *Air* is in its *ordinary temper*:
" but *vapours, winds* and *clouds* alter the *Standard*, ſo that
" the *Quickſilver* ſomtimes *falls*, ſom-
" times *riſes* in the *Glaſs*, proportion-
" ably to the *greater* or *leſs acceſſion* of
" *gravity* and *compreſſion* the Air hath
" received from any of thoſe *alterati-*
" *ons*: and the *degree* of *increaſe* beyond
" the *Standard*, is the *meaſure* of the
" *additional gravity*. Is not this pret-

If you would ſee how true Mr *Glanvill* ſpeaks, reade Mr. *Boyle* his eighteenth Experiment, and the defence of it againſt *Linus*: there you will finde that the *Mercurial Cylinder* did in winter ſomtimes correſpond with the *weather Glaſs* and ſomtimes vary: and the reaſon Mr. *Boyle* gives, is ſuch as takes off from the certainty of Mr. *Glanvill's* CONCLUSION.

tily ſaid by a man that writes *a year* after Mr. *Hook*, and more after Mr. *Boyle*? How unacquainted is *He* and his *Aſſiſtants*, even with the *Writings* of their fellow-*Virtuoſi*? And if we may be allowed to transfer the *Fool's Cap* from the *Ancients* for *concluding too ſoon*, may we not *crown* the heads of our *Virtuoſi* now therewith? And how careful the *R.S.* is in making good their promiſe to *Olaus Borrichius*, that what *their Members* ſhould write, the whole *Society* would be reſponſible, let any man judge that conſiders how Mr. *Hooke*, and Mr. *Glanvill* (I beg Mr. *Hook's* pardon for the *unequal* compariſon) diſagree; and Dr. *Henſhaw* (another *Virtuoſo*) differs alſo from Mr. *Glanvill*, ſaying, That *the Quickſilver Tube will not give ſo exact an account of every ſmall difference in the preſſing Air, as the* THERMOMETER! what *confuſion* ſhall we be reduced unto *in time*, ſhould theſe *contradictious Experimentators* proceed as they have done! I ſhall here adde, that I do conceive that this *notion* of an *Aerial column gravitating* upon the *Earth*, or ſubjacent body, was framed in imitation of the *Hypotheſis* of *Simon Stevinus*, the Teacher of *Mathematicks* to Grave *Maurice* of *Naſſau*, in his fourth book of *Hydroſtaticks*, where he inſiſts much upon this *Aqueous Golumn*; but 'tis obſervable that that *judicious* perſon, the better to make out his *Theoremes*, preſuppoſeth ſuch things as give ſome repute to my objections about the *Aerial Cylinder* or *Columna*, viz.

1. *Aquam omnibus partibus eſſe ponderitatis Homogeneæ.*

2. *Cujuſvis aquæ ſuperficiem planam & horizonti parallelam eſſe.*

3. *Aquæ fundo horizonti parallelo tantum inſidet pondus, quantum eſt Aquea Columnæ cujus baſis fundo, altitudo perpendiculari ab aquæ ſuperficie ſumma ad imam demiſſæ ſit æqualis.*

Out of this laſt *Propoſition*, and the *demonſtration* and *conſectaries* thereof in *him*; 'tis manifeſt, that he ſuppoſed not one of *his* aſſertions would hold (though the *Phænomena* were the ſame in *nature*) as he *worded* and explained *them*, if

if that he did not free his *aqueous Column* from any *oblique preſſures*, and make it *rectangular*. And as for his *Poſtulatum*, that the *ſurface* of the water is *plain*, flat and *level*; he confeſſes it is not ſo *really*, viz. *Quatenus pars eſt ſphæricæ ſive mundanæ ſuperficiei; mundanam autem ſuperficiem dicimus ſphæræ cujuſvis mundo concentricæ*: he only profeſſeth to aſſume it as *true*, becauſe in *hydroſtatics*, things happen as if it really were ſo; whereupon he ſcruples not to make uſe of a *ſuppoſition*, which is *really*, *confeſſedly*, and *demonſtrably falſe*, as long as it conduceth to *practice*, and ſerves his turn as if it were *true*, without purſuing a more *tedious*, and not *more uſeful* Hypotheſis agreeable to *Archimedes*. Which I take notice of by way of *Apology* for my ſelf, and thoſe who think fit to *acquieſce* in, or not to *blame* ſuch *Methods* as are *effectual*, though otherwiſe *vain* and *groundleſs*. Another thing is, that *He* ſuppoſeth *there* that the *Earth* is the *Center of the world*. Out of all which I am more and more ſatisfied of the validity of my former doubts againſt this *ſo much concluded upon* Aerial Column, to the explanation whereof I finde no ſuch *cautions*, or *previous ſuppoſitions* uſed, to take off the edge and force of ſuch objections: neither indeed have I yet met with any thing of *that ſubject* propoſed in a *Scientifical way*; and therefore much how it comes to be *concluded upon* ſo as Mr. *Glanvill* repreſents it to be.

§ Stevinus *hydroſtat Elem. l.* 4 *Theorem* 8.

Id. ib. poſtulat. 6.

Id. ib. poſtul. 7 *Et profecto tam receptum fuerit hæc ipſa non admittere, quam poſtulantibus Aſtrologis* terram eſſe mundi centrum fidem derogare.

Whereas I have ſaid, that the *gravitation of the Air* (even *Elementary*) is an opinion of *Ariſtotles*, and that *his* Experiment was tried by *Claramontius*; I adde, that the *verity* of that *trial* (though indeed it extend only to the *impure Atmoſphere*) is atteſted by *Ricciolus* in theſe words, "*Duo* "*quarto* Aquam, & Aerem *noſtrum habere aliquid levitatis* "*gravitati admiſtum, ut viillius adſcendant, ut ſint ſupra id* "*quod eſt ipſis gravius*; & *vi hujus deſcendant. Hinc fit ut* "*folles luſorii, & Aere addenſato bene inflati, etiam ſine fari-* "*nulæ ac vim infuſione, plus ponderent, quam flaccidi: ut ex-* "*quiſita trutina deprehendes: immo ego expendi veſicam bo-* "*vinam, quæ flaccida erat ſcrupulorum* 4. & *granorum quatuor,* "*eſſe inflatam ſcrup.* 4. *grav.* 6. *quære Aer additus per infla-* "*tionem appendebat grana duo*. Thus the incomparable

Ricciol. *Almagnev. l.* 2. *c.* 5 *ſect.* 4.

Ricciolus, whom I may as well reckon amongſt the *Peripateticks*, as Mr. (*a*) *Boyle* doth *Schottus*: and how true that *Ariſtotelean* Experiment is Mr. *Boyle* demonſtrates in his (*b*) *pneumatick diſcourſes*. And though the works of *Galilæo*, *Kepler*, *Merſennus*, *Gaſſendus*, *Pecquetus*, *Paſchal*, were loſt, and were as ignorant as ſome *Virtuoſi* of their *trials* about the *weight* of the *Air*; yet would not the *Aſſertion* have ſeemed ſo *ſtrange* and *incredible* as Mr. *Glanvill* repreſents it to be; for though *Maynenus* deny it, yet he brings in this Objection. "*Aer eſt gravis, &c. go. probatur prim*o "*a* Mathematicis, *qui de* Aeris pondere *ſcripſerunt, invene-* "*runtque ejus ponderis momenta.* 2. A Franciſco Mendoza, "*qui in ſuo viridario problema inſtituit*, An in Aere navigari "poſſit? 3. *A deſcenſu lapidum & aliorum gravium, quæ* "*Aeris pondere prægrammata urgent ſuum deſcenſum, & velo-* "*cius in fine quam in principio moventur.* 4. *Experimento ad-* "*ducto a* Baſſone, *qui follem inflatum citius deſcendere ait* "*quam Aere vacuum, ob additum* Aeris pondus. l. de motu. in- "tent. 1. art. 3. *Berigardus* alſo aſſerts the *gravity of the Air*, and juſtifies it by this *Barometer*, and the *unequal* aſcent of the *Mercury* on the *top*, and at the *foot of a mountain*. I ſhall ſumme up all, that may take off from the *novelty* of the thing, and deprive the R.S. of the *glory* of *pretending* to any *intereſt* in the *diſcovery* in the words of *Thomas Bartholinus* de pulmon. ſect. 3. p 60. "*Ingenioſus* Sanctorius *in in-* "*veniendis inſtrumentis Medicis, inter alia Com. in* 1 *Fen.* A- "vic. *Stateram ponit, qua ventorum vim & impetum ponde-* "*rat. Inventis aliquid addam. Vitream phialam lanci noſtræ* "*impone, & leni halitu inflato videbis quam parum ponderi ac-* "*creverit. In inſtrumento* Magdeburgico *teſtatur* Otho Ge- "riche *Conſul Magdeburgenſis & inventor ejus*, ponderari "poſſe Aerem *hoc pacto*; *quanto levius eſt vitrum poſt* Aerem "*extractum, tantum ponderabat* Aer *antea in eo contentus. Varios* "*modos alios* Aeris levitatem *bilance expendendi tradit* Caſpar "Ens *Thaumat. Mathemat. Probl.* 93. *c.* 15. *Veſicam bovinam* "*ſe expendiſſe ait* Joannes Bapt. Ricciolus *Tom.* 1. *Almag.* "*nov. l.* 2. *c.* 5. *num.* 4. *quæ flaccida erat ſcrupulorum quatuor &* "*granorum quatuor: & deprehendiſſe eandem inflatum ſcrupu-*

lorum

a Againſt *Hobs* c. 3.

b Experiments of Air. Exper. 6. and againſt *Hobs* c. 3.

Democrit. reviviſc diſp 1. c. 2. p. 84 in 4to.

Circul. *Piſan.* part. 6. circ. 7. de nutritione.

☞ Sanctorius *was a* Galeniſt.

" *lorum* 4. & *granorum* 6. Marcius Merſennus *in Phænom.*
" *Propoſ.* 29. *aſſerit ſe Geometris præſentibus & adjuvantibus*
" *ponderaſſe bilance Æolipilam æneam ſatis calefactam, &*
" *propemodum candentem, omnique humore deſtitutam & quam*
" *minimum Aeris continentem; deprehendiſſeque pondus fu-*
" *iſſe unciarum quatuor, drachmarum* 6. & *granorum* 15.
" *poſtquam vero naturaliter refrixiſſet Æolipila, & Aer an-*
" *tea rarefactus red iſſet ad priſtinum ac naturalem ſuum ſta-*
" *tum, iterum ponderaſſe ipſam, & inveniſſe pondus præcedente*
" *pondere majus fuiſſe quatuor gravis. Plura in hanc rem con-*
" *geſſit. cl.* Caſp. Schottus *in Mechan. p.* 1. *protheor.* 4.
" *c.* 6.

I have not *Schottus* by me at preſent; neither is there need of any *further Inquiries*; for I have ſufficiently demonſtrated that the *Gravitation of the Air* is an opinion of *Ariſtotle, Averroes,* and other *Peripateticks,* though not *generally* received by *that ſort of Peiloſophers*: and that it was *truly* and *experimentally* demonſtrated by *them,* eſpecially as far as the *Atmoſphear* is concerned in the *Queſtion.* I have alſo made it *apparent,* that the *Barometer,* or *Mercurial Experiment* doth not diſcover the *weight of the Air* with any certainty; much leſs, *all the degrees of it*: That the *preſſure of the Air* is not by way of a *Cylinder* or *Column*; and that the *Barometer* had not its *original* but *denomination* from the *R.S.* they were, as I may term them, the *God-fathers,* not *Parents.* The *World* may juſtly *ſay* of the Honourable Mr. *Boyle,* that *he* hath improved the *Experiments* of his *Predeceſſors,* and repreſented them more *accurately*; and of Mr. *Glanvill* and *his Aſſiſtants what it pleaſeth.*

In the marginal note (*page* 15.) where I ſay, that *perhaps it is not true that* Ariſtotle *had any hand in, or was privy to the impoiſoning of* Alexander; I adde that *Pauſanias* after he had ſpoke of the *Stygian* water, and its *ſtrange property,* doubts whether *Alexander* were made away by ſuch *means,* or no: Σαφῶς μὲν οὐκ οἶδα· λεγόμενον δ' οὖν οἶδα. This *he* ſays (in *Arcadic*) without reflecting any way upon *Ariſtotle* as one concerned in the report. And *Arrianus* who writ the life of *Alexander,* out of the *Memoires* of *Ptolomæus Lagides*

(who was preſent when that great *Prince* died) avows, that *he died of a ſurfet*: yet he relates ſundry *rumors* about his death, one whereof is, that *Ariſtotle* (being fearful of *Alexander* after the death of *Caliſthenes*) ſhould prepare the poiſon for *Antipater*, to be ſent him: but concludes thus, καὶ ταῦτα ἐμοὶ, ὡς μὴ ἀγνοεῖν δόξαιμι μάλλον ὅτι λεγόμενά ἐστιν, ἢ ὡς πιστὰ ἐς ἀφήγησιν ἀναδεδεγμένῳ. *Arrian.* de expedit. *Alexandr. l.* 7.

Whereas I reflect (*page* 16.) upon that paſſage of *Plato*, Ὁ Θεὸς γεωμετρεῖ, and what Mr. *Glanvill* ſaith, "*That* "*without* Geometry *we cannot in any good degree underſtand* "*the Artifice of the Omniſcient Architect in the compoſure of* "*the great World and* our ſelves: *and that the Univerſe muſt* "*be known by the Art whereby it was made.*——— There ſhould have been a *Chaſme* made for ſome paſſages, I know not why omitted. I adde therefore, that it is not *revealed* unto us that God made the *Univerſe* according to that *Art*, and it ſeems an Additional to the firſt *Fiat*, or *let there be*— in *Geneſis*, to ſay his commands were regulated by the rules of *Geometry*, and his *powerful* and *omnipotent* word confined thereunto. Had Mr. *Glanvill* been pleaſed to conſult the *fathers*, he would have found that this *Tenet* of his is no *primitive* notion: and that particularly *Euſebius* hath refuted it, denying that God in his Works is obliged to *Geometrical* numbers; and that *Socrates* (whoſe authority is greater then *Plato*'s) did place *no great value on thoſe Sciences*: that the firſt *Chriſtians* did ſlight the knowledge of *them* as uſeleſs to *Piety* and *knowledge of God*; becauſe my opinion about theſe things is agreeable to that of the firſt *Chriſtians*, and of *Socrates*; I ſhall inſert the whole paſſage, as it is tranſlated into *Latine* in the *Paris* Edition.

Mr. Glanvill *p.* 25.

Euſeb. de præp. Evang. l. 14. c. 4.

Euſeb. *præp. Evangelicæ l.* 14. *c.* 10, 11. edit. *Paris.* 1628.

Primum tamen quoniam *Mathematica* illa *ſua* tantopere jactare ſolent, prorſusque *neceſſarium* eſſe dictitant, ut quiſquis comprehendendi veri ſtudio tenebitur, *Aſtronomiam*, *Arithmetriam*, *Geometriam*, *Muſicam*, illa nimirum ipſa, quæ ad eos a *Barbaris* profecta eſſe jam oſtendimus, perſequatur:

quatur: (his enim qui carebit, *doctum perfectumque Philoſophum* eſſe neminem, imo rerum veritatem ne primoribus quidem labris diguſtare poſſe, niſi qui *harum* ante rerum animo cognitionem impreſſerit:) deinde hanc ſuarum artium peritiam magnificentius oſtentantes, æthere ſeſe medio *ſublimies* propemodum incidere, *numeriſque ſuis* ipſum quoque *Deum* circumferre arbitrantur: nos vero *qui ſimilium diſciplinarum amore non flagremus*, nihil a *pecudibus* abeſſe exiſtimant, *deique* propterea nunquam nunquam *rei paulo gravioris notitiam percepturos* eſſe pronunciant: Age, hoc ipſum quam pravum ſit atque diſtortum, vera laminis loco ratione propoſita, ſic tanquam ad libellam & regulam exigamus. Erit ea quidem ejuſmodi, quæ Græcos, innumerabiles, infinitoſque Barbaros complexa; alios tametſi *his artibus* doctriniſque paratos, nec *Deum* unquam, nec *honeſtæ vitæ rationes*, nec omnino præclarum & *utile* quid percepiſſe; alios, ut ab omnium diſciplinarum ſtudio deſtituti eſſent, *religioſiſſimos* tamen ac *ſapientiſſimos* extitiſſe demonſtret. Enimvero quænam hoc in genere *Socratis* illius, qui ab iſtis omnibus tantopere celebratur, ſententia fuerit, e *Xenophonte* intelliges, ſi modo ei ſuis in *Memorabilibus* hæc ſcribenti fidem adhibebis.

"Docebat, *inquit ille*, præterea, quatenus cujuſque rei "peritum eſſe hominem *bene inſtitute* oporteret: principio "*Geometricæ* dandam eatenus operam eſſe dicebat, ut ſi- "quando res paſceret, dimenſam rite terram vel accipere ab "alio, vel alii tradere, vel eam dividere, vel opus aliquod de- "ſignare poſſet. Id porro tam eſſe ad diſcendum facile, ut "qui dimenſionem attendere voluerit, idem ſimul & quanta "ſit terræ magnitudo aſſequi poſſit, & quænam ejus metien- "dæ ratio breviter admodum expediteque cognoſcere. At "ejuſdem in *Geometricæ* ſtudio, ad illas uſque deſcriptiones "intellectu difficiliores quenquam progredi, *Socrati* non "placebat. *Cui* enim *bono* futuræ illæ eſſent, videre ſe, ta- "metſi ne illarum quidem imperitus eſſet, rogabat. Enim- "vero, ad exhauriendam hominis vitam cum ſatis illas eſſe, "tum aliarum interim & plurimum & *utiliorum doctrinarum* ſtudia impedire. *Aſtronomiam* ſimiliter eatenus com-

plecti

" plecti ſolum jubebat, ut *noctis, menſis, annique tempora*
" cognoſceres, atque hujus cognitionis ope, ſiquando vel
" iter, vol navigatio ſuſcipienda eſſet, vel agendæ forent ex-
" cubiæ, vel in aliud quidlibet quod noctis, menſis, annique
" ſpatio fieri ſolet, incumbendum, ſignis ad ea omnia ſuis
" quæque temporibus obeunda, certioribus uterere. Atqui
" hæc nihilo difficilius tam ex nocturnis venatoribus, quam
" ex navium gubernatoribus, & aliis quamplurimis reſciri
" poſſe, a quibus eorum peritiam ſuæ cujuſque partes offi-
" ciumque depoſcat. At *eandem artem* eo uſque perſequi,
" dum ea quæ non eodem motu circumferantur, ſtellaſque
" ſimul errantes & vagas diſtinguere noveris, adeoque in ea-
" rum abs terra intervallis, converſionibus cauſisque riman-
" dis ætatem vireſque conſumere, id vero graviter imprimis
" ac ſerio prohibebat, quod *multum hujus* etiam *opere preti-*
" *um* videret, tametſi ne in iſtis quidem rebus hoſpes ipſe
" ac peregrinus eſſet. Addebat, conficiendæ hominis vitæ
" illas quæque ſatis futuras, quæ interim a pluribus *utiliori-*
" *buſque ſtudiis* avocarent. Poſtremo quibus *cœleſtia* quæ-
" que rationibus *Numen* moderetur, inveſtigari nolebat,
" quod eum eo ab hominibus aſpirari non poſſe, tum minus
" cum diis probari exiſtimaret, qui quæ prompta notaque
" eſſe noluiſſent, inquireret. Nec minus illi, quem ea ve-
" hementius cura deſtineret, *inſaniæ periculum* imminere di-
" cebat, quam *Anaxagoræ*, qui explicatus a ſe *deorum Ma-*
" *chinas* tantopere gloriabatur.

I ſhall adde, that if *God Almighty* be regulated by the rules of *Geometry*, and *mechanical motion* in the management of this *world*, and that the *fabrick* of things is *neceſſarily* eſtabliſhed upon *thoſe Hypotheſes*, I cannot any way comprehend how *God* can do any *miracles*: how the *Sun* ſhould *ſtand ſtill* at the command of *Joſhuah*, or the *ſhadow* go back on the dial of *Ahaz*: or how there could be a *general deluge*; or ſuch an *Eclipſe* as is related at the death of our *Saviour*: or that the fire ſhould not *burn*, or deſtroy the *three children*: in *which*, and *other caſes*, if *God* were not tied up to this *Art*, I do want proof (till *he declare* it) that *at other times* he acts *altogether* agreeably *to it*. This opinion

nion of mine hath been hitherto the moſt *Chriſtian* Aſſertion, and held moſt conſonant to *Piety*, and hath been amply maintained of late by Dr. *Henry More*, in oppoſition to what the *Royal Society* lays down in their Hiſtory; "*That* Gene-
"ration, Corruption, *Alteration, and*
"*all the viciſſitudes of* Nature, *are nothing*
"*elſe but the effects ariſing from the meet-*
"*ing of little bodies, of* differing figures,
"magnitudes *and* velocities. *Then which* opinion *there can be nothing more* peſtilent *and* pernicious; *and Dr.* More, albeit a *Member* of *this Society* heretofore, (for he allows nothing to it now) yet a *pious* one, profeſſeth that this *Mechanical Philoſophy* doth incline to *Atheiſm*: neither would he approve of thoſe *deductions* as *neceſſary*, but *ridiculous*, when I upbraided him *lately* with that *non-ſenſical* and *illiterate* Hiſtory, Mr. *Sprat p* 348. "*'Tis true,*
"*his,* [viz. The Experimental Philo-
"ſophers] employment *is about* materi-
"al things. *But this is ſo far from*
"*drawing him to oppoſe inviſible* Beings,
"*that it rather puts his thoughts into an*
"*excellent good capacity to believe them.*
"*In every* work *of* Nature *that he handles, he knows that*
"*there is not only a* groſs ſubſtance, *which preſents it ſelf*
"*to all mens Eyes; but an infinite ſubtilty of* parts, *which*
"*come not into the ſharpeſt ſenſe. So that what the* Scri-
"pture *relates of the purity of* God, *of the* ſpirituality *of*
"*his* Nature, *and that of* Angels, *and the* ſouls *of men,*
"*cannot ſeem incredible to him, when he perceives the*
"*numberleſs particles that move in every mans* Blood, *and*
"*the prodigious ſtreams that continually flow unſeen from every*
"body: *having found that his own* ſenſes *have been ſo far aſ-*
"*ſiſted by the* Inſtruments of *Art, he may ſooner admit that*
"*his minde ought to be raiſed higher by an* Heavenly *light,*

Mr. *Sprat pag.* 312.

I wonder that *ſuch effects* ſhould be attributed by *them* to the bare *concourſe* and *meeting* of *corpuſcles* of *differing figures, magnitudes* and *velocities*; without taking notice of that *alteration* of *texture*, and of the *figures* of *the concurrent particles*, without which *Carteſianiſm*, nor the other *Mechanical Philoſophies* can ſubſiſt: and not ſo without allowing the conſtant aſſiſtance of *God*, *directing* and ordering lay-*Mechaniſm*. So *des Cartes* Princ. Philoſ part. 2. *Deus materiam ſimul cum motu & quiete in principio creavit; jamque per Solem ſuum concurſum ordinarium tantundem motus & quietis in ea tota, quantum tunc poſuit conſervet.* Oh! *rare* and *ſenſible* explication of things! God Almighty in a *peculiar matter agitates matter!* muſt we thus explain the *ſecondary* and *mediate creation* of the world in *ſix days*, whereas the *like productions* have not happned in ſo many *thouſand years* as are lapſed ſince! Beſides, whatever our *Virtuoſo* thinks of the *Eternal Generation* and *Incarnation* of the Son of God; *He* doth not except in this Aſſertion the *Generation* of *mankinde* in the ordinary and *natural* way.

in

"in thoſe things wherein his *ſenſes* do fall ſhort. If (as the "Apoſtle ſays) the inviſible things of *God* are manifeſted "by the viſible: then how much ſtronger Arguments has "he for his belief, in the *eternal Power* and *Godhead*, from "the vaſt number of creatures that are inviſible to others, "but are expoſed to his view by the help of his *Experi-* "*ments*? My *cenſure* upon this place is, that if his *Expe-* *rimentator* have any skill in *Logick* or the *ways of arguing*, though from the *Rules of Mechaniſm*, and the *contempla-* *tion of viſible bodies*, he may proceed to the allowance of *in-* *viſible* and *inſenſible corpuſcles*, yet ſhall he ſtill confine his *progreſs* and *aſcent* within the nature of *matter* and *corpuſcles*, and never apprehend (upon thoſe grounds) the *being* and *o-* *perations* of an *immaterial, omnipreſent Deity* acting by the *Word of his Power* and *Will*: nor the *incorporeal nature* of the *ſoul of man*. Such a *Tranſition ad genus a genere*, or μετάβα-σις εἰς ἄλλο γένος, he that owns thoſe *principles* cannot aſ-ſent unto, if he underſtands himſelf, and argue not ſo as to alledge,

One *Propoſition* for *ſence*,
The *other* for *convenience*.

Where I ſpeak of *Archytas* (pag. 18.) that he was a *pra-* *ctical* and *Mechanical* Philoſopher, contrary to what Mr. *Glanvill* aſſerts (*pag.* 27.) I ſhall adde his life; As it is "briefly written in *Ricciolus* thus. "*Archytas Tarentinus* "*Pythagoreus nobilis, Mathematicarum peritiſſimus, quem ut* "*una cum* Timæo *cognoſceret* Plato, *in* Italiam *navigavit, ut* "*ait* Cicero. *In* Mechanicis *excelluit, & vi illarum quin-* "*quies vicit hoſtes in prælio, ut nihil dicam de columba lignea,* "*quam libramentis ad violatum compulit; ſed in Coſmogra-* "*phia at* Geometria practica *excelluiſſe indicat illud* Horatii "lib. 1. odorum.

Ricciolus in Chronic. part. 2. præfixo ad Almag. fl nov. ta Archytas.

Te maris ac terræ numeroque carentis arenæ,
Menſorem cohibent Archyta.

Neither

Neither is Mr. *Glanvill* mistaken there in reference to *Archytas* only: what he saith about *Eudoxus Gnidius* is false: who was a *Mechanician* also, and amongst other discoveries, "*Invenit etiam Arachnen, horologium videlicet so-*
"*lare, in quo lineæ horariæ, & arcus signorum in modum araneæ*
"*se secant.* Blancan. in Chronol. Mathemat. Sevil. 5.

Blancanus saith of *Archytas*, that *he was Mechanicæ Inventor*, in Chronol. mathem. secul. 5. And *Will. Snellius* in his Preface to the *Hypomn. mathem.* of *S. Stevinus*, doth reckon upon *Archytas* and *Eudoxus* as eminent for *practical Mechanicks.*

Whereas I say (*page* 22.) that the *Royal Society* were not the first that applied themselves to the observing the *formes of Animals*, &c. by the *Microscope*: *I* adde that *Zucchius* did not only *precede* them in the attempt, but seems to have had *better glasses* to that purpose then they: for whereas Mr. *Hooke* in his description of a *Flea* says of the *Eyes* only this, that *the head is on either side beautified with a quick and round black eye*: the more accurate *Zucchius* saith, "*Novissime Microscopio parato ab excellentissimo Vi-*
"*trorum in omnes formas ad propositos usus formatore D. Eu-*
"*stachio Divinio* Septempedano, *spectavi meis oculis senescen-*
"*tibus* Oculum pulicis, *distinctis in eo albescente* Sclerotide
"*a* Cornea, *& per corneam* Iride *oculi.* And in the description of the *feet* of a *Fly*, and the *feather* of a *Peacock*, I observe that there is such a *difference* betwixt those *two Writers*, that as *one* of them must needs be in an errour, so I am apt to think that our *Virtuoso* is the person: see Mr. *Hooke p.*167,168,169,170. and *Zucchius* Philos. opt. part. 2. tr.3. c.7.sect.4. pag.349,350. If *England* do yield better *Microscopes* then those of *Eustachius Divinius*, then I am ready to change my judgement.

Mr. *Hook* micrograph. p.210. *Zucchius* philos. opt. part 2. cap.2. sect.2.p.39.

Where Mr. *Glanvill* speaks of going to the *World of the Moon*, and I animadvert upon the difficulties of the *journey*, and that his *lodging* will be too *hot* for him; adde in the Text these words *page* 43.

Besides the other difficulties of the *journey*, 'tis further considerable, that from the *Centre* of the Earth to the Moon, according to the calculation of *Tycho Brahe*, there is near *56 semidiameters of the Earth*, which is about 192416 miles: and admit it be supposed that Mr. *Glanvill* flie 20 miles every day in ascending towards that *world*, he should be above *15 years* before he could come to the Orbe of the Moon.

Van. Etten Mathem recreations pag. 220,221.

Where I ſpeak againſt the accommodating of *Scripture* to *common railing*, p. 49. I adde, that not only the *Council* of *Trent* (— *fas eſt & ab hoſte doceri*) hath prohibited *Seſſ.* 4. that *any* ſhould apply the *holy* Scripture *ad ſcurritia, fabuloſa, vana, adulationes*; but alſo that the firſt *Council* at *Millain*, forbids the uſing it *ad jocum, oſtentationem, contumeliam, ſuperſtitionem, impietatem*. And, to upbraid our *Divine*-Railleurs a little more, an ancient *African*-Council decrees, *Si Clericus, aut Monachus verba ſcurritia, jocularia riſumque moventia loquitur, acerrime corripiatur.* The words of which *Canon*, (viz. *Scurritia & jocularia*) are by a learned *Frenchman* rendred *raillery*. —— "*Nous avons le Canon d' un ancient Concile d' Afrique, qui parle en ces termes*: Si quelqu' un du "Clerge ou ſi un Religieuſe dit des paroles de raillerie, des "choſes plaiſantes & enjouees, qu' il ſoit chaſtie tres ſevere-"ment. *Qu' euſſent dit* a voſtre avis *ces bons Peres ſi ces rail-"leries euſſent eſte terees de l' Eſcriture*? This Queſtion hath been agitated with much wit and addreſs in *French*, betwixt Mr. *de Girac* and Mr. *Coſtar* in ſundry books, wherein any man of *common reaſon and piety*, will give the advantage to adverſary of *Voiture*, who is juſtified by the concurrent opinion of *Balzac* in his remarks *ſur les deux ſonnets*: and to theſe Writers I refer our *Virtuoſi*, ſuch as reckon upon all *other learning* as *Pedantry*, may inform themſelves thence as out of Writers which tranſcend not *their breeding* and *ſtudies*.

Whereas (*pag.* 58.) I ſpeak ſomewhat in commendation of the ancient *Ariſtotelean* Monks, I finde that their *eſteem* is much advanced by the learned *Gabriel Naudæus* in theſe words. "*After the laſt taking of* Conſtantinople, *Learning* "*began to creep out of* Monaſteries, *which for all the time before* "*had been* (*as it were*) *publike* Chriſtian Schools, *where not* "*only* youth, *but alſo ſuch* men *as would apply themſelves that* "*way, were inſtructed in all manner of* Diſciplines, Sciences, "*and* Morality, *and that to ſuch an height, that not content with* "*that ſo famous* Quadrivium *of the* Mathematicks, *which*, "*beſides all that is now ſhewn in* Colledges, *was then taught*, "Medicine *both as to* Theory *and* Practice, *was ſo well culti-*"*vated, that we need no more to convince us how expert they* "*were therein, then the Writings of* Ægidius, Conſtantine,

Gabr. Naudæus Hiſt. of Magick c. 7.

and

" *and* Damaſcene, Joannitius, Peter *of* Spain, *and* Turiſa-
" nus, *So that it were eaſie for me to anſwer them who charge them with* illiterature *and* ignorance.

Where I ſpeak out of *G. Hofman* and others, that it is ſufficient for a *Phyſician* that he proceed upon ſuch rules and *methods* as may moſt *commodiouſly* guide him in his *practice*, without being ſolicitous whether they be *rigorouſly* and *philoſophically* true: *pag.* 75. I adde, that there are others as eminent as any that ever pretended *to cure*, which concurre with me in this opinion. As *Avicenna* and *Riolanus*; the words of the latter in his *Examen* of *Harvey*, *c.* 9. are theſe. " — *Quapropter cum* Avicenna doctr. 6. cap. *diſtinguo ſermo-*
" *nem* utilem a vero; *Medicus* qua Medicus, inquit ille, *non*
" *curat, quid in* veritate *ſit, ſed contentus eſt Phænomenis qui-*
" *buſdam, quæ ſunt ſatis illi* in curatione *morborum.*

I adde unto the paſſages (*pag.* 97.) which relate unto the diligence of the *Ancients* in *Diſſections*, this: That the *Ancients*, and particularly the *Peripateticks* were very *curious* and inquiſitive into *Anatomy* appears by this paſſage out of *Chalcidius*, in his diſcourſe upon the *Timæus* of *Plato*; he lived about *one thouſand one hundred and ſeventy years* ago, and the paſſage (which relates to the *Platonick* notion about viſion) in the *Latin* Edition of *Meurſius*, (*pag.* 340) runs thus. *Quare faciendum ut ad certam explorationem Platonici dogmatis* commentum vetus *advocetur* medicorum, & *item* Phyſicorum, *illuſtrium ſane virorum, qui, ad comprehendendam ſanæ naturæ ſolertiam*, actus humani corporis, facta membrorum exſectione, rimati ſunt: *qui exiſtimabant, ita demum ſe ſuſpicionibus, atque opinionibus certiores futuros, ſi tam* rationi viſus, *quam* viſui ratio *concineret. Demonſtranda igitur oculi natura eſt: de qua cum* plerique alii, *tum* Alcmæus Crotonienſis, *in Phyſicis exercitatus, quique primus* exſectionem *aggredi eſt auſus*; & Calliſthenes, Ariſtotelis auditor; & Herophilus, *multa*, & *præclara in lucem protulerunt*. Out of which it is manifeſt that the *Ancients* (eſpecially the *Ariſtotelians*; for ſuch were *Caliſthenes* and *Herophilus*) did with ſome curioſity examine the *Phænomena* of *nature*, and *regulated* their *opinions* by *ſenſible experiments*; and that this was the *practice* of moſt of the eminent *Phyſicians* and *Naturaliſts* of old.

The Letter of *Hippocrates* to *Damagetas* mentioned *pag.* 89. (though cited as *genuine* by *Galen*) is ſuſpected by *Jo. Baptiſta Cartes.* miſcell. medic. dec. 1. c. 4. " *Cæterum & hæc* " *Epiſtola, quæ ſub nomine* Hippocratis *circumfertur, ſuſpecta* " *eſt mihi, primum quia* Diogenes Laertius *lib. 9. in vita* De- " mocriti *ſcribit illum nequaquam* ridentem, *quanquam con-* " *cedat ab* Hippocrate *fuiſſe viſitatum* (non quidem ut ipſum " ſanaret) *quo tempore jam* Democritus *erat* decrepitus, *nec* " *amplius aptus ſectioni cadaveram: nam* Hippocrates 436 " *annos ante* Chriſtum *natus*; Democritus *vero* 492 *ita ut* " *ita ut* Democritum *nativitate ſecutus ſit* Hippocrates 56 " *annis: & tum ſive ad videndum, ſive ad ſanandum eum con-* " *veniret, vigeſimum quintum annum attigiſſe veriſimile vide-* " *tur: cum tunc temporis* Hippocrates *medici famam adeptus* " *eſſet, quod non poterat niſi* per longum *temporis curſum &* " *varia experimenta in Medicina facta ſibi comparare. — Sed* " *probandam provectiorem* Hippocratis *ætatem, & majorem* " *ſenectam* Democriti, *ejuſdem* Laertii *teſtimonium extat di-* " *centis; Ultimum, quod in vita* Democriti *legitur dictum,* " *aut factum, fuiſſe illam cum* Hippocrate *collocutionem: at-* " *que annum agentem* 109. *ab hujus vitæ Statione deceſſiſſe. I finde alſo that* Menagius *ſuſpects thoſe Letters, though he confeſs them to be very ancient. Extant hodie* Hippocratis *de ſua ad* Democritum *profectione* Epiſtolæ, *ſed* ſuppoſititiæ, *licet* perantiquæ.

Menag. in Diog. Laert. l. 9. p. 238.

Whereas *I* ſay *pag.* 114. that I have obſerved in *ſome* that their *pulſes* have ſuffered no *alteration*, at leaſt kept no *time*, or *palpitated* as did their hearts. I ſhall illuſtrate this with an obſervation in a young Lady, which I had too fatal an opportunity lately to make: ſhe died of a very *malignant Feaver* joyned with the *Meaſils*: two nights before *ſhe* died I watched with her, and frequently *obſerving* the *variety* of her *pulſe*, I determined to minde whether there were any ſuch alteration in the beating of the *Heart*, as I then obſerved in her *Arteries*: *I* laid my hand upon her Breaſt, and I found that her *heart* did not beat as uſually it doth, the *bone* erecting it ſelf, and impelling the *left ſide*, but it ſeemed like a *great bullet* (tranſcending any proportion that is natural

tural to the *Heart*) as it rolled in the *Thorax* from the *right* to the *left side* (as much one way as the other) with an *uniform* and *equable revolution*, and thus it continued to do for an houre; during which time I obſerved all the *varieties* almoſt that are recorded about *evil pulſes*: as *quick, ſlow; great, ſmall; unequal, deficient, dicrotus, &c.* Nor is this new; for *Riolanus* ſaith in *Exam. Harvey* c. 3. *Notavi multoties in palpitationibus cordis vehementibus arterias non ſequi motum Cordis, ſed bis terve pulſare Cor pro una diaſtole Arteriarum: quod indicat Arterias in ſanis & ægris corporibus, non ſemper ſequi motus cordis.* So doth *Mercatus* teach, *Fit interdum palpitatio cordis nihil mutatis pulſibus.* Tom. 2. de Philoſ. differ. l. 2. tr. 1. c. 28. & tom. 3. l. 2. c. xj.

Since the writing hereof, being caſually in the *ſhop* where an *old man* was blooded, who upon the healing up of an *old ſore* in his leg, was very ill: I obſerved his *blood* to have very little of what was *crimſon* in it: but it ſeemed all a *fluid Serum* to the bottom, (which was *pellucid*, not of a turbid *white*,) in ſome *Pottingers*: in one *Pottinger* that ran laſt, it was coagulated into a thicker maſs, on the top whereof was coagulated a *tranſlucid gelatine* over moſt of the *Pottinger*, the reſt being of a *fluid Serum* like to the *other*: I took ſome *ſpirit of Vitriol*, and poured a *pretty quantity*, (*viz.* about 20 drops) on that which was partly *coagulated upwards*, partly *not*: and all that part which was not *blood*, did coagulate into a *maſs* like unto the *white* of an *Egge* when hardened by the *fire*, but without that *ſmell* which is uſual to it when coagulated upon a *gentle fire*: the *blood* under it coagulated into a conſiſtence much like wax: but of a *dark red* inclining to *black*: into another Pottinger I poured ſome of the *ſalt-peter liquor* that had paſſed the *Aſhes*; but this latter cauſed no *change* at all: I then *poured* on *the ſame* ſome *ſpirit of Vitriol*, as in the other, and it did immediately turn *lacteous*, and coagulated into a maſs like to that of ordinary *cuſtards*: and the *blood* under, which ſeemed but very little, and ſcarce coagulated, appeared thereupon as a *large quantity*, equalling three parts of the *Pottinger*, upon which all the *Serum* was thus *coagulated*. I went to burn theſe:

that

that *blood* which had only *ſpirit of Vitriol* did not *crackle*, and ſcarce *burn*: though *a little* it did: the pure *coagulated Serum* did not burn at all, yet *crackled* like *decrepitating Salt*, a little: that with the *ſpirit of Vitriol* and *Lixivium of Nitre*, did burn with a *vivid* and *laſting flame* a long time.

I think my ſelf obliged to adde one thing more where I ſpeak as if Dr. *Willis* had had little to do in the diſcoveries of Dr. *Lower* about *Anatomy*: that although that great *Phyſician* had not leiſure to attend the *Anatomical Inquiries*, yet did he propoſe *new matter* for *improving the diſcoveries*, and put Dr. *Lower* upon continual inveſtigation, thereby to ſee if *Nature* and his *Suppoſitions* did accord: and although that *many things* did occur beyond *his apprehenſion*, yet was the *grand occaſion* of that work, and in much the Author. This *Intelligence* doth not croſs what *I* related before from *good teſtimony*; yet I thought my ſelf obliged to declare the *whole truth*, and ſuch I beleeve *this* to be. I muſt alſo profeſs that *I* think the *Sinus venarum vertebrales*, whoſe *invention I* aſcribe to Dr. *Lower*, may without *conſiderable injury* be aſcribed unto *Fallopius* in his Anatomical Obſervations pag. 193. edit. *Colonienſ.* 1562. in 8°. Thus much *I* thought fitting to annex, leſt the *Virtuoſi* ſhould cenſure me as partial to my old *School-fellow* Dr. *Lower*, or ſwayed by any regard then that of *Truth*.

The *Hogs-blood* which *I* laſt mentioned as poured upon the *Mothers of Salt-peter*; after it had ſtood above three weeks *unmixed*, did at laſt caſt down about half of *it ſelf* below the *Mothers*, it continuing in *that* place it turned *crimſon*: that on the *top* did not change its *colour*, but on the *ſurface* there gathered a *cruſt* or *maſs*, not very thick (as before) nor of ſo *ſolid* a *coaſiſtence*.

FINIS.

To divert my *Reader* after so tedious a discourse, I shall here adde the Letter of *Coga* their *Patient*, that they may see how efficacious the Transfusion hath been on *him*, and what returnes he makes for his *Cure*.

To the Royal Society the VIRTUOSI, and all the Honourable Members of it, the Humble Addresse of
AGNUS COGA.

YOur Creature (for he was his own man till your Experiment transform'd him into another *species*) amongst those many alterations he finds in his condition, which he thinks himself oblig'd to represent them, finds a decay in his purse as well as his body, and to recruit his spirits is forc't to forfeit his nerves, for so is money as well in peace as warre. 'Tis very miserable, that the want of natural heat should rob him of his artificial too: But such is his case; to repair his own ruines, (yours, because made by you) he pawns his cloaths, and dearly purchases your sheeps blood with the loss of his own wooll. In this sheep-wrack't vessel of his, like that of *Argos*, he addresses himself to you for the Golden Fleece. For he thinks it requisite to your Honours, as perfect Metaplasts, to transform him without as well as within. If you oblige him in this, he hath more blood still at your service, provided it may be his own, that it may be the nobler sacrifice.

The meanest of your Flock,
AGNUS COGA.

17029 C3

CAMPANELLA REVIVED.

Or an Enquiry into the

HISTORY

OF THE

Royal Society,

Whether the *Virtuosi* there do not pursue the Projects of *Campanella* for the reducing *England* unto *Popery*.

BEING

The *Extract* of a Letter to a *Person of Honour* from *H. S.* with another Letter to Sir *N. N.* relating the cause of the Quarrel betwixt *H. S.* and the *R. S.* and an Apology against some of *their Cavils*.

WITH

A Postscript concerning the Quarrel depending betwixt *H. S.* and Dr. *Merrett*.

Aut hoc *inclusi* ligno occultantur *Achivi*;
Aut hæc *in nostros fabricata est* machina *muros*,
Inspectura domos, *venturaque desuper* Urbi;
Aut aliquis *latet* error: *equo ne credite Teucri*.

LONDON,

Printed for the Author, 1670.

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TO THE

READER.

THis ensuing Letter was a part of what I sent long ago to a Person of Honour in this Nation, to represent the occasion of the quarrel betwixt Me and the Virtuosi, and shewed the necessity of pursuing it: by such arguments I used as gained his approbation; and the generality of serious men have assented thereunto, though their opinion was, that the design might be of great danger and trouble to the bold undertaker. After that, I inserted it into a discourse concerning the Virtuosi, in which I debate many other things: viz. In opposition to Dr. Merrett, I deduce the original of Apothecaries from the times of Hippocrates and Aristotle thorough the Roman and Greek Empires; and shew with what prudence both Physicians and the Civil Magistrates concurred to their institution: and I have largely entreated on that Question, which the Virtuosi, in order to the ruine of the Faculty of Physicians, and of the Trade of Apothecaries, to the great alteration of the Practice of Physick, and aggrandising of themselves, have started, and with much confidence and more ignorance handled. I shew not only sundry particular impostures obtruded upon us by some of them: as also an account of a certain Model of the R. S. published in Germany, and written from London; in which there is so little of truth, that I wonder any of the Virtuosi should abuse Foreigners with such a Relation; or imagine that renown to be durable the foundation whereof is so vain and unstable. It is there that I demand they would make goood their

Vide *Ph. Jacob. Sacks* in *Gammarolog.* pag. 65,66,67.

Vide *Th. Bartholin.* Epiſt. Centur. 4. Ep. 92.

promiſe *to the learned* Olaus Borrichius, *that* none of their Colleagues ſhould publiſh any thing but by the allowance and conſent of the R. Society, that thereby it might be ecured againſt the cavils and exceptions of all Men. *VVhich* aſſurance *of* theirs, *how ill they have managed, I dare appeal unto the* world *as Judges. I am now indiſpoſed to publiſh the whole Treatiſe, and reſerve it for ſome* additions *which* Mr. Evelyns *diſcourſe of* Forreſt-Trees *may invite me unto; the* Second Edition *whereof wants not its* defects; *and if I ſhould trouble my ſelf to examine his account of the* Birch-Tree, *it will appear as* ridiculous *as the* Hiſtory *of* Salt-Peter: *and 'tis to me a* Miracle, *that neither* He, *nor all* his Correſpondents *ſhould inform us better of ſo obvious a thing: Neither is it leſs ſtrange that I ſhould be neceſſitated to diſpute againſt another* Virtuoſo, *Mr.* Chamberlaine, *whether it be our* King's Prerogative to define what Books of Scripture are Canonical, and what Apocryphal? *And, whether it be* the Intereſt of our Monarchy that all the Commonalty be kept poor and in a complaining condition? *But I paſs from theſe conſiderations, to ſome exceptions made againſt what I have already publiſhed. It is ſaid, that I have* maliciouſly repreſented the places cenſured in their Hiſtory: *which if I have done, it is becauſe they* maliciouſly writ them: *for I am not conſcious of* miſ-alledging them, *or of impoſing any* other ſenſe thereon, than the words do bear: *and if* any man *can* interpret *them otherwiſe than I do, I confeſs I have wronged them: but if it be not poſſible to do ſo, they muſt blame* themſelves: *However, ſuppoſing the paſſages might bear a more* favourable conſtruction, *yet ſince the ſenſe I follow is the* moſt natural, *ſince that they might be conſtrued to the prejudice of the* Church of England, *it is judged by* me, *and* others, *to be an* important ſervice to the Publick, *to extort a* poſitive Declaration of their meaning, *leſt another* Brerely *make a benefit from* thoſe words *to overthrow the* Proteſtant Religion. *I am further preſſed with this* intergatory, *why I ſhould imagine that the* R. S. *would ſubvert the* Faculty of Phyſicians, *there being ſo many eminent men of that Profeſſion admitted therein, and ſo eſteemed by them, as that they cannot be judged to* vilifie *that Faculty. I anſwer,* Quid verba audio,

Mr. *Chamberlaines* preſent State of *England*, pag. 341. Edition 3. & pag. 61.

audio, cum facta videam? *I see* they do do it, *and therefore am not to be harangued into another sentiment. At first* they *would have incorporated the* Colledge of Physicians *into* their Society: *but that the* prudent *and* grave *did decline: then they promoted the* Anti-Colledge *of* Pseudo-Chymists, *encouraging* Odowde *and his* ignorant Adherents *in opposition to the* Physicians: *and this is not more* notorious *to the world, than it is also that those* objections *with which* M. N. *and other* Quacksalvers *amuse the* Age *were suggested unto them by the* Virtuosi, *and derived their repute* from them. *As for Mr.* Glanvills *book, it was perused by* several of their Members, *and corrected* by them, *and how much we are reduceable to a* Society *that could allow of* that, *and would not at my* reiterated importunities *call* it in, *or* disclaim *it, Let all* Physicians *judge. Nor would I have any man to believe that there are so many eminent* Physicians *of the* R. S. *for neither is the number of* those admitted *considerable*; few of note *but have* deserted *it again*; *the rest* approve not of it: *so that all they talk of will not amount to* three understanding persons; *and were* they more, *I do not find* our Faculty *better secured than that of* Divinity, *or the two* Universities *are by such Members thereof as are imbodyed into this* Trojan-Horse. *It is said also, that my* Animadversions *on Mr.* Glanvill *contain* little of matter; *to which I answer, that* they *contain enough to have made twenty* Virtuosi *famous, and would have acquired them a* Memorial *of* ingenious *and* noble Experimentators: *they contain enough to shew the* ignorance *of that person who had so insulted over all* University-learning, *and particularly over the* Physicians: *They contain enough, since they contain more than* they all knew: *and I think I have done great service to the* learned, *in shewing that these* Virtuosi *are very great* Impostours, *or men of* little reading: *either of which* Imputations, *if* just, *will secure us from* their *arrogance, and abate* their esteem. *I am blamed for diminishing the* glory of our Nation, *by ascribing* all discoveries *to the* Antients, *or else to* Foreigners: *to which I answer, that they take off from the* glory of our Nation *more, who usurp the* inventions of others: *I rather preserve the* credit *of the* English (*though not of the* Virtuosi) *then diminish*

it:

it: undue praiſes add not to any mans eſteem: *nor do I think I derogate from* Dr. Willis, *if I ſhould ſay that his notion about the uſe of the* Cerebrum *and* Cerebellum *was fairly intimated by* Carlo Ruini, *that ingenious* Bologneſe, *in his* Italian *Anatomy of an* Horſe: *neither do I leſſen the performances of the Honourable and* curious *Mr.* R. Boyle, *when I averr that* Ariſtotle *did hold the* Ayre to be ponderous, *and* weighed it *before* him; *or that the* Elaſticity *of the* Ayre *was* (*as to* name *and* thing) *fully propoſed by* Pecquetus; *and which is more than I have yet ſaid, yet 'tis true, even the compariſon betwixt the* Atmoſphear *and* Flocks of Wool *is urged by him.* "Fingito tibi Aerem "hunc velut ſpongioſi vel *LANEI* potius cumuli terra- "queum orbem ambientis molem: —— *And,* "Inſitus aereæ "ſubſtantiæ ad rareſcendum Elater ſpongiæ *LANEVE* na- "turam imitatur. *As little is Dr.* Croone *or Dr.* Throſton *injured, if I ſay that the Experiment about reviving a* ſtrangled Fowl *by blowing* ayre into the Lungs, *was practiſed by* Veſalius, *and* Bogdan, *and was vulgarly known before, though perhaps not to the* Virtuoſi: *and that the ſame* Phænomenon *ſucceeds, if when Children are* Still-born *any one* blow into their Breech: *which experiment is well known to many* Midwives; *nor do they doubt the recovery of the* Child, *if the* Guts *do rumble thereupon. Theſe, and ſuch like averrments of mine, being* true, *do not leſſen the* juſt eſteem of any man, *and argue* candour in me, *not* malice. *Beſides, ſince that the* Virtuoſi *did with this* borrowed glory *attempt to over-bear the* Univerſities *and all others as* Ideots *and* Ignoramus's, *'twas neceſſary to inform them that neither the* Antients, *nor modern* Academicks *were ſo* fooliſh *as they* painted them out to be, *nor the* R. S. *ſo* inquiſitive *as they would ſeem: and that if others would practiſe* thoſe Artifices, *even the* Peripateticks *might* ſignalize themſelves *as eaſily as the* Royal Society. *But I reſerve the further proſecution hereof till another time: that which follows being of more importance to the* Monarchy *and* Religion *of our* Kingdomes, *than that I ſhould detain my Reader any longer* from it.

Pecquet. diſſert. Anatom. cap. 8. per totum.

Veſal. de fabr. hum. corp. l. 7. c. 19. *Mr. Bogdan.* apoleg. pro vaſ. Lymph. 988.

Warwick May 16. 1670.

Henry Stubbe.

CAMPANELLA REVIVED, &c.

NEver was there any ſort of people that by ſo many *Artifices* endeavoured to inſinuate themſelves and their *Religion* into all places and countryes, as that of the *Papiſts*: there is no *Treaty* or *promiſe* can ſecure an *enemy* from their ſecret *underminings*: there is nothing ſo *un-moral*, which their *Caſuiſts* do not allow of, and *practiſe*; nothing ſo *impious*, or *bloudy*, but is an ingredient in their *councils*, when ſubſervient to their *ends*: there is no *ſhape* or *diſguiſe* which they will not aſſume, no *humour* which they will not comply with; not an *Action* of theirs but ought to be ſuſpected, ſince their *Confeſſours* have that influeuce over their *Layety*, that whatſoever may, *but at a diſtance*, *prejudice* or tend to the detriment of their *Church*, they inſtantly put a period and ſtop thereunto. I ſpeak not this to reflect upon the *Society*, who have found ſo great *encouragement* from that *party*, by the concurrence of their *perſons* and *purſes*: and ſo freely keep a *correſpondence* with *them* from beyond ſeas: I only ſay, that as ſuch an *entercourſe* is not unknown to the *Congregatio de propaganda fide*, ſo (whatever Mr. *Sprat* ſuggeſts) they do not apprehend the *conſtitution* to be any way to the *prejudice* and *dis-ſervice* of their *Faith* and *Church*. I believe it is not diſpleaſing to *them*, to ſee how *friendly* the *Proteſtants* and *Papiſts* converſe together in *this Aſſembly*: and it muſt needs raiſe their *hopes* of bringing things to a *cloſer union*, when they perceive the *ſtrangeneſs*, that ought to be, and *hath been* betwixt them, taken off, and to read addreſſes commencing with, Holy Father. How much an *Oratour* gains upon his *Auditors* when

when he hath made them *attentive*, and what a ſtep that is to gaining upon their *eſteem*, and how conducing that is towards the *perſuading them to what he intends*, I well underſtand: but what benefit and advantage *Popery* may derive from *this*, that our *Nobility* and *Gentry*, our *Divines* and *Layety*, laying aſide all memory of the *French* and *Iriſh Maſſacre*, and *Marian* perſecutions, the *Gun-powder Treaſon*, the *firing of London*, and forgetting all *animoſities* and *apprehenſions of future dangers*, converſe *freely* with, and *write* obligeingly to *them*, teſtifie a great eſteem of *them*, and from the *dis-uſe* of all *harſh* but *too true cenſures*, come at length to lay aſide all *rancour and bitterneſs of thoughts*; I ſay, how great benefit *Popery* may draw hence, I cannot well comprehend: yet I gueſs in part from what the *Hiſtorian* ſets down "From "enduring each others *company*, they may riſe to a learning "of each others *opinions*; from thence to an exchange of *good* "*offices*; from thence to real *friendſhip*: till at laſt by ſuch a "Gentle, and eaſie *Method*, our ſeveral *intereſts* and *ſects* "may come to ſuffer one another, with the ſame peaceable-"neſs as men of different *trades* live one by another, in the "ſame *ſtreet*. Is not this a very fair account of what the *R. S.* will bring things unto? and can we wonder that the *Papiſts* ſhould be very *civil* in their returns to an *Aſſembly* that ſo highly obligeth them? But they add, "It is *diſhonourable*, "to paſs an hard cenſure on the Religions of *all other Coun-*"*tries*: It concerns them, to look to the *reaſonableneſs of* "*their faith*; and it is ſufficient for us to be eſtabliſhed in "the *Truth* of our own.— Well! Adiew to all the Sermons of Biſhop *Andrews* upon the fifth of *November*: all that King *James* writ againſt the *Papacy*, and to prove the *Pope* to be *Antichriſt*: farewell to a great part of our *Homilies*, to part of the *thirty nine Articles*; the examples in *Scripture* whereby the *prophets* and *holy men* declare againſt *Edom*, *Tyre*, *Sidon*, &c. or againſt the *Scribes* and *Phariſees*, or *Diana* at *Epheſus*, or the *Idols* at *Athens*, theſe are *diſhonourable* and *pernicious*. Give me leave to ſpeak to theſe *Virtuoſi* in the language of the *Romiſh* Saint *Francis*, viz. *Salvete fratres Aſini*; *ſalvete fratres Lupi*. Oh! how the followers of *Conthen* the

Pag. 426.

Pag. 63.

Jeſuit

Jesuit hugg themselves to hear these insinuations! *Multum profecit error, tum id obtinuit ne delegatur.* See but the *wayes* which he proposeth in order to the reducing of *Heretieks* to the *Roman Church* again there, and if *this procedure* be not agreeable to the *examples* which *he* suggests, *may I never find credit.* You see what applauds Mr. *Sprat* would have gained from that *Jesuit* for this *History*: but how would *Campanella* have *clapped his hands* for joy to see this *happy establishment* which *he* so long ago *projected*, in order to the converting of *England*, *Holland*, and other *heretical countreys*? It was his *darling* design, and which that *Fryer* (one of the most *politick* that ever was) so often *inculcates* in his book of the *Spanish* Monarchy.

Conthen. *Politic. l. 2. c. 18. Sect. 6.*

Campanella touching the *Spanish Monarchy*. Ch. 10. pag. 47.

His Prince "Should banish all *Theological Questions* out of 'the *Transalpine* Schools: seeing that all the *Divines* of those 'parts turn *Hereticks*, by not continuing firm to the Holy 'constitutions of the *Pope*, but are still raising up *fresh controversies*: and the wits of these men are to be exercised only 'in the disputes of *Natural Philosophy*.

'He shall do well to shut up all the *Greek* and *Hebrew* 'Schools; because that these two languages have been de'structive to *Monarchy*; and are besides the *main* pillars by 'which those *Heresies* that chiefly raign at this day are *built* 'upon. And therefore, on the contrary, let him endeavour 'to bring in the knowledge of the *Arabick* tongue; by means 'whereof the *Mahumetans* may be the better convinced; and 'the troublesome *Transalpine* wits may employ themselves 'rather in confuting the *Turks*, than in vexing the *Catholicks* 'with *their* disputes.

'Let him also erect *Mathematical* Schools ----- because by 'this *means* the *Peoples* Minds will be diverted from creating 'Us [*Papists*] any trouble, and will be incited to bend 'their Studies that way, which may be *useful to the King*.

I follow the English *Edition: but the* Latin *is more* Emphatical.

Our Author did not think of the Universal Character *of Mr.* Dalgerno.

Ch. 25. *pag.* 157. *Concerning* England.

"Now as concerning the weakning of the *Engliſh*, there
'can *no better way be poſſibly found out*, then by cauſing *diviſions*,
'and diſſentions amongſt *themſelves*, and by continually keep-
'ing up the ſame; which will quickly furniſh the *Spaniard*
'[or *French*] with better and more advantageous *Opportuni-*
'*ties*. And as for the *Religion* of that people, it is [then] of
'*Calvin*; though very much moderated, and not ſo rigid,
'and auſtere as it is at *Geneva*: which yet cannot be ſo eaſily
'extinguiſhed and rooted out *there*, unleſs there were ſome
'certain *Schools* ſet up in *Flanders* (with which the people
'of *England* have very great commerce) by means of which
'there ſhould be ſcattered abroad the Seeds of Schiſme and
'Diviſions in the *Natural Sciences*; as namely betwixt the
'*Stoicks*, *Peripateticks*, and *Teleſians*, by which the errours of
'the *Calviniſts* may be made manifeſt. -----Being of a Nature
'that is ſtill deſirous of *Novelties*, and *change*, they are eaſi-
'ly wrought over to *any thing*.

'Tis much better done by the Virtuoſi *now at* Arundel-*houſe, under the encouragement of*

Ch. 27, *pag.* 177. *Concerning* Flanders *and lower* Germany.

"To conquer them there are but two wayes left now to be
'taken: the firſt of which is to ſow the Seeds of *Diviſion*
'amongſt them: and the ſecond to draw them forth of their
'own Countrey. *Cadmus* having a deſign of erecting a Mo-
'narchy at *Thebes*, whither he came a *ſtranger*, is ſaid firſt
'to kill a *Serpent*; by which was ſignified, the Defence and
'Safe-guard of *Thebes*: and then afterwards to ſow the *Teeth*
'of it; that is to ſay, to ſcatter abroad the *Poyſon* of *Deſire of*
'*Innovation*, and an earneſtneſs to be inſtructed in the know-
'ledge of *Learning*, namely in ſuch *new Sciences* and *Arts*,
'as he had brought over with him from his own Countrey.
'And hence *Souldiers* are ſaid to ſpring up, who through
'*mutual diſcord*, ſlew each other; and the remainders of
'them that were left, joyned themſelves with *Cadmus*, their
'Head and Captain; ſo laying the foundation of the King-
'dome

'dome of *Thebes* in *Bœotia*. I affirm therefore that *these very* '*courses* ought to have been taken by the King of *Spain*; 'and not a war to have been only maintained againſt them all 'this while.

'And certainly, if the *Southern* people would ever conquer, 'or lay the foundations of a Monarchy over the *Northern*, ſee- 'ing that they are *not ſtrong* enough to bring the ſame about, 'they *ought* to have recourſe to the *Arts* either of *Cadmus*, or of '*Jaſon*: although of the two, *Jaſon* went the more wiſely to 'work; ſeeing he firſt won the Heart of *Medea*, that is, the 'good will and affections of the *Northern women* to him.----- 'Afterwards *Jaſon* by the enchantments of *Medea*, ſlew the *Dra-* 'gon, that is, the *Guard* of the Kingdome; ſuch as are the va- 'liant and warlike men of a Nation, with the *Preachers*. And 'then did he by the means of *Enchanted Oyntments*, tame fierce '*Beaſts*, the Brazen-footed and Fire-ſpitting *Bulls*; that is, by 'his *friendſhip* and *gifts*, he won over to him the *Nobles* and 'principal men of the Kingdome. And at length, *by them* he 'ſowed about the *Teeth of the Dragon*; that is, by the aſſiſtance 'of the *Nobles*, he ſpread abroad the ſeeds of Diſcord and *Diſ-* '*ſention about Religion, Arts*, and *Honours*. Whence, in the laſt 'place, ſprung up *Souldiers*, that is, *Factions*; (ſuch as are 'thoſe of the *Guelphs* and *Gibellines*, the *Pontificians* and *Im-* '*perialiſts*, the *Lutherans* and *Catholicks*) wherein they kil- 'led each other: But thoſe that remained, choſe *Jaſon* for 'their *Head*, and *Commander*; and though few in number, yet 'afforded Him their aſſiſtance in the getting of the *Gol-* '*den Fleece*, that is to ſay, ſuch an *Empire* as we hear 'ſpeak of.

After this he proceeds to direct ſeveral things, whereof one Pag. 180.
is, that by all means it be ſolidly taught, that *the Pope is not* *Antichriſt*; for upon the gaining of this point (ſayes *He*, and I deſire it may be marked) *do all the reſt depend*: And, (in or- der to the caſting away of all *practical Divinity*, and the intro- ducing of *ſome ſuch Religion*, as Mr. *Sprat* would have) "It muſt Pag. 'be unanimouſly and ſtoutly maintained againſt *them*, that All '*Commentaries* whatſoever that have been written upon the *Bi-* '*ble*, whether by *Catholicks* or *Hereticks*, ever ſince S. *Auguſtins*

'time, are to be ſuſpected, and not to be truſted unto. Mr. *Sprat* ſaith that the foundations on which the Church of *England* ſtands, are no other, but (in the *firſt place*!) the Rights of the
Pag. 362. *Civil power*: the imitation of the *firſt uncorrupt Churches* (in
Pag. 355. the *ſecond place*! and *thirdly*) the *Scripture expounded by Reaſon*.—— "*Religion* ought not to be the ſubject of *Diſputations*: It 'ſhould not ſtand in need of any devices of *Reaſon*: It ſhould in 'this be like the *Temporal laws of all Countreys*, towards the 'obeying of which there is no need of *Syllogyſms* or diſtinctions; nothing elſe is neceſſary but a bare promulgation ('the 'Papiſts phraſe is *ſufficient propoſition*!) a common apprehenſion, and ſenſe enough to underſtand the Grammatical meaning 'of Ordinary words.—— Thus he caſts off all *Scholaſtick* and *Polemical* Divinity, and writes as if he did not own the *Three Creeds*, and *four general Councils*, or *thirty nine Articles*: we muſt uſe no *Syllogiſms*, though to prove the *Trinity*, or *meritorioufneſs of Chriſts death*, or our intereſt therein by a *practical Syllogyſm*, and *fides ſpecialis miſericordiæ*: no *Analogy of faith* to regulate us by: no *Church-Hiſtory*: in fine, we muſt look *no farther* than the *Grammatical meaning* of *ordinary* words, though the *Sacrament*, and *Hoc eſt corpus meum*, be the *ſubject of the debate*. ---- I find indeed that *Campanella* adds, that "*the mul-*
Pag. 182. '*tiplying of Books, and the ſpinning out of Controverſies, do but 'add Authority to a bad cauſe, and beſides alſo ſhews like a kind 'of Victory.*

'Theſe *Hereticks*, after they had put forth *new Bibles* into the 'world, and wreſting all the *Fathers* and *Hiſtorians* as they 'pleaſed, put ſuch interpretations upon the ſame as they 'thought good: they then began, in order thereunto, to apply 'themſelves to the ſtudy of the *Hebrew* and *Greek* tongues, and 'ſtarted a thouſand Grammatical Niceties, wherewith they 'have filled up many great Volumes: inſomuch that the whole '*North* in a manner makes a *Grammatical* war upon us, rather 'than a *Spiritual*: Whereas We have long ſince laid aſide the 'ſtudy of *Languages*, ever ſince we overcame the *Hebrews*, '*Greeks*, and *Latines*, and have made them ſubmit themſelves to '*Chriſtianity*, or elſe have deveſted them of the power of diſ-'charging all Political and Sacerdotal Adminiſtrations; as it is

'with

'with the *Jews* at this day. And therefore we intend not now 'to trouble our ſelves any further with *petite Sophiſtical Nice-* 'ties, and *Grammatical Quirks*: but relying only upon our own 'ſtrength of Wit, we let alone all prolix *courſes of Diſci-* 'plines, and the tediouſneſs of writing huge Volumes: mean 'while that *theſe men* ſpend their time herein, and *weary* us out 'almoſt with their *Cavillings*, although they do not get the 'better of us. I conceive therefore, that *theſe men* ſhould be 'taken off from *theſe Grammatical Hereſies*, namely, by ſome 'New *Arts* and *Sciences*, and *ſuch wherein we are excellent our* 'ſelves. And to this end the *King* ſhould erect certain *Schools* 'in all the principal Cities, wherein the *Arabick* tongue ſhould 'be taught: that ſo by this means there may be ſuch among 'his Subjects, as ſhall be able to Diſpute with the *Turks*, *Moors*, 'and *Perſians*, who by the uſe of that Tongue do ſpread their 'Mahometaniſme, as we do *Chriſtianitie* by the *Latine* Tongue; 'and ſo by *theſe means* our *inteſtine wars* may be laid aſide, and 'our Arms turned againſt foreign enemies.

Nor ever ſhall have occaſion to be troubled with *them*, if our *Hiſtorian* prevail.

'There ſhould be Schools alſo erected for the *Mathematicks*, 'and *Aſtronomy*, unto which theſe *Northern* people ſhould be 'invited to come, by propoſing Salaries for ſuch of them, as 'ſhall apply themſelves to the Diſcovering, and giving an Ac- 'count of ſuch *Starrs* and *Conſtellations*, as are found in the 'other *Hemiſphear*, in the *new world*. For by theſe means there 'would redound to the *Spaniſh* Empire both Honour and Pro- 'fit. I would alſo have the Schools of the *Old Philoſophers* to 'be opened again; as of the *Platoniſts* and *Stoicks*, and of the 'Teleſians, that ſo the people may be diverted from *Theological* 'Queſtions, and may apply themſelves to ſtudy *Queſtions* of *Phi-* 'loſophy: for thoſe come nearer to the *Chriſtian faith*, than the 'Doctrine of *Ariſtotle* doth. Now the *King* in doing theſe 'things, ſhall follow the example of *Hercules*, who to the end 'he might the more eaſily overcome *Antæus*, drew him 'forth of his own Territories; and alſo of *Cadmus*, 'who brought over *New Arts* and *Sciences* with him into *Bœo-* 'tia; and by means of the ſame, got to be Prince of the Coun- 'trey. And by taking of this courſe, the *Principal* among the 'Hereticks, when they ſhall ſee there is more to be gotten

And of *Democritus* and *Epicurus* too!

'*there* then *here*, forſaking their *Hereſies*, will become Ring-
'leaders in the Sects of *Philoſophy* and *Aſtronomy*.

'——There ſhould alſo be erected publick *work-houſes* for
'the exerciſes of *Mechanical Arts*, to which this people is
'exceeding apt: and ſo by this means will the Buſineſs of
'*Navigation* be much promoted, together with the skill of
'beſieging Towns, and of taking them in by the uſe of Ar-
'tificial *Fire-works*. By theſe means the *People* (probably)
'will be taken off from their *Falſe Religion*, and *divided one*
'*from another*; to the great advantage of the Kingdome of
'*Spain*, to whom many will now come and tender their ſervice:
'and his Empire, which of late hath been contemptible and
'hateful to the world, ſhall recover its antient Splendour and
'Honour.

Theſe are the *paſſages* which I think I firſt accommodated to the *Royal Society*, and which ſerved me as a *Key* to expound their *Hiſtory* by: and although the *indignation* I conceived againſt Mr. *Glanvill* of the affronts he and his *Aſſiſtants* had put upon the *Phyſicians* was the *firſt motive* which put *me* upon *writing*, yet it was a regard I had to the *Religion* and the *Education of our Youth* (which I found undermined by theſe *Campanella's*) which *imboldened* me never to *lay aſide* my Pen. I was afraid leſt our *Virtuoſi* with their *trinkets* and *experiments* would ſerve *this Nation* ſuch a trick as the *Pyed-Piper* at *Hammel* in the Dutchy of *Brunſwic* did thoſe Inhabitants: He firſt played in the Town and all the *Rats* and *Mice* follow'd him, which He ſo deſtroyed: then He played again, and their *Children* followed him, and thence He lead them out of the Town unto an *Hill*, into which He went, and they followed him, and periſhed all. Some of theſe paſſages I have cenſured in my firſt book printed at *Oxford*; it being manifeſt, that without a Regard to thoſe *Popiſh* Machinations, no man would have inſerted any thing of *ſuch import* which was no way neceſſary to the vindication of the *Virtuoſi* or matter intreated on.

Wierus *de Præſtig. Dæmon. c.*

To his ever honoured Friend, Sir N. N.

SIR,

ALthough the *multiplicity* of byſineſs ariſing from my *practice* in the Countrey, and the great inclinations I have to improve each *vacant minute*, in the proſecution of my *ſtudies*, although theſe occaſions render me not ſo *civil* to my friends by any entercourſe of *Letters*, as I *ſeemingly* ought to be, yet do not they at all diminiſh my *reſpects* for them, ſo that they may as abſolutely as ever diſpoſe of my *ſervices*, though the confirmation thereof be not daily renew'd unto them with all that noiſe of *ceremony* and *Flattery* with which this *impertinent age* doth abound. Your Letter brought with it all thoſe circumſtances that could juſtly endear it unto me; and I was infinitely ſatisfied to underſtand that I had ſo important a place in that *memory* which retains nothing *vulgar* and *trivial*: Theſe ſentiments alone were enough to tranſport me into ſome vanity, and place a greater value on my ſelf than I know I merit, becauſe you write, that is think, *I have ſome*; and I am almoſt ready to yield that to the *opinion of your judgement* that which I have many demonſtrations againſt. I am pleas'd to underſtand that ſo many *ſerious* and *real Patriots* of this Kingdome do approve not only of my undertaking the *Royal Society*, but of my *performances* therein: what others, eſpecially *judicious* and *ſober perſons*, ſay of us, is a thing no *virtuous perſon* ought to look upon with indifference: though the greateſt comforts in all actions ariſe from that content which our own *breaſts* afford us. My life hath been a continual ſcene of *dangers*, which the Rebellion in *Ireland*, Poverty, Sickneſs, and other accidents involved

involved me in, but though in a thousand misfortunes I have reflected on my condition as *irreleivable*, yet of all the *intricacies* that ever I encountred, the beginning of *this Quarrel* did represent unto me the *worst* and most *perplexed* I ever encountred: All the others appeared like the contrivances of a *resistless Fate*, this to depend upon my *own election*; All others did at once acquaint me with the whole prospect of the *hazard* I was in, and my thoughts discovered unto me clearly what grounds I might relye upon for *hopes*, and what *occasions* I had to *despair*, and amidst these resentments I was prepared for any issue *Providence* would ordain me: but *in this* I could not any wayes imagine what might be the consequence of the attempt, whence to derive any *assurance*, or where to terminate my *fears*: so that I was forced to abandon all those *melancholick apprehensions*, and to deduce my encouragements from the *necessity of the Action*, and from that *despair* which made all troubles and even death it self pleasant, since I could make no other estimate of *England*, but that even the poor remains of *Religion* and *Learning* amongst us were so imminently endangered, that I could not expect their *long continuance*, nor with patience think how to survive them. All men represented unto me the perils into which I threw my self, but none more than I foresaw my self: none had the confidence to imbolden me, many dissuaded me: but in the whole affair I consulted the tranquility of my *own mind*, and determined upon that course wherein I found the most *content*, not the most *profit*: and agreeable to the directions of that *Hebrew* Proverb, *Though sixty Counsellours tender you an advice, yet reject not the dictates of your own breast*, I fixed upon those resolutions which were most conformable to my Soul, and in which I found my *internal peace* best established: I left the conduct to God, whose glory was concern'd so highly, and bottomed my self upon this ground alone as to *outward supports*, that my design must be agreeable to all that regarded the interest of the *Monarchy* and *Religion* of this land, the welfare of the *Church* or *State* the happiness of *this Generation* and of *Posterity*: and inste of making particular friends (or matter of great *uncertain*[a]

now [t]

now) I hoped that the particular concernments of the *Church* of *England*, the two *Universities*, the *Colledge* of *Physicians*, and of all *Artisans*, would supply that defect. The *History* of the *R. S.* and Mr. *Glanvills plus ultra*, did furnish me with undenyable arguments of the *common danger*; and the general and constant *discourses* as well as *deportment* of the *Comical Wits* or *Vertuosi* were such, that no *gloss* or *comment* could create another representation of things. Sir, it is not unknown to you what influence *Education* hath upon any *Government*; that without a regard *hereunto* the best *Laws* become *useless* and *ineffectual*, thorough the contempt and malepertness of the Subjects: and the most noble designs of *Princes* frustrated for want of *befitting instruments* to carry them on: By the sole force of *good Education* sundry Governments have subsisted, whose constitution hath been *defective*, and whose disturbances and calamities have been such as would have shatter'd into pieces and confusion any *weaker foundation*: of this *Lycurgus* took an especial care, and the paucity of his *Laws* was admirably supplyed by his diligence *herein*: and the neglect hereof is justly censured by *Aristotle* in other Republicks. Upon this account our prudent Ancestors, (knowing how much more untractable *Northern people* were than others, sacrificing upon any occasion their *lives* unto their *passions*) have been eminent in their cares for the educating of our *Youth*, Gentry and others, to *such knowledge* and *customs* as was necessary to the due honouring of *God*, and the welfare of the *Nation* and *Government*. From this care had our *Universities* their original, and that publick breeding in *Free Schools*: and the advantages are these, that by the *Uniformity* of the instruction mens minds may be better united and cemented together, (no material difference arising, nor each seeming to the other *foolish* and *ridiculous*, where all are inured to the *same sentiments*) and not only that confusion is prevented which *private Tutors* would occasion by infusing *different* and *repugnant* principles into the *Youth*, but even the deportment and inclinations of all becomes evident to the *Magistrates* and others, which best and most naturally discover themselves in their *tender* and

Aristot. *Ethic.* *l.* 10. *c.* 9.

unwary

unwary years, from whence the *prudent* can judge what to hope, or expect from them in their maturity, how to *discourage*, *distrust*, *confide* in or *employ them*: the *Tutors* they have, the *Books* they converse with, the *studies* and *usages* which they like and dislike, are thereby known: and of those evil fruits which some men have afterwards produced, 'tis notorious that the first *buds* and *blossoms* were, or might have been observed during their continuance at the Universities. Pardon a despised Peripatetick if I tell you that it is an opinion *Aristotle* betrays me into, that the source of all our evils, and the continuance of them, is derived from the neglect of *publick Education*: nor doth there appear to me any possibility of remedying thereof, or reconciling us by the establishment of *new Laws* (how *penal* soever) but by resetling a *fitting Education*: this *diligently* pursued, would *insensibly* and *infallibly* atchieve that which no *Laws* will ever do where they are to encounter *grown men*, whose *resentments* are *violent*, and their *reasons weak* especially as to *remote consequences*. This *general advantage* to the *publick*, was attended with *another* not of less importance: *viz.* that since the condition of our *Nation* and Monarchy requires that all be principled in the *Protestant Religion* in opposition to *Popery* (the *restoration* of which would indanger the Title of our *King* to his *Crown*, or render it *feudatary* and obnoxious to *foreign power*, as any man that is acquainted with *History* must know: it would also *embroyl* us in the restitution of *Church-lands*, which as *they* make up the greatest part of *most mens estates*, so the rendition of them, if I can judge of the posture of *England* now, will be more *facile* than that of the *Episcopal Revenue* lately was) and in *conformity* to the *Church*, whilest *custome*, *example*, and *uniform instruction* would represent those *ceremonies* and *habits* as *decent*, *orderly* and *rational*, which would otherwise seem *uncouth*, and *phantastical*: Besides these, it was a further security to our Government, that the *Education* there did qualifie men to a *submission* to and love of our *Government*: It being evident that

Let these Considerations (if others from Piety seem contemptible) teach us wisdome before an absolute impossibility to redress our evils: Leave us no consolation but despair, for not having timely foreseen and prevented them.

that the *Politicks* of *Ariſtotle* ſuit admirably with our *Monarchy*, and men are well prepared to own and ſupport a *reiglement*, which that intelligent *Phyloſopher* ſo long ago repreſented as the *Idea of humane policy*, in oppoſition to the *Seignioral* and *abſolute Monarchy*. The *Ethicks* there are *generous*, and ſubſervient to *Religion*, and *civil prudence*, and all manner of *virtue*: the *Logick* and *Metaphyſicks* are ſo entwiſted with the *eſtabliſhed Religion*, and ſo requiſite to the ſupport of it againſt *Papiſts* and *Socinians*, that without a *miracle* the neglect *hereof* muſt bring a change in the *former*: even *common wiſdome* teacheth us that we muſt vary our *Weapons* and *Militia* according to what our *enemies* practiſe: thus when the world aſſumed *Guns*, we have been forced to abandon our *Archery*, and quit thoſe *fortifications* which ſufficed againſt all former approaches, ſince the *battering Canon* were introduced: the learning of the *Sarracens* prevailing on the minds of men *endued with reaſon*, the *Monks* and *Eccleſiaſticks* were forced to Study *School-divinity* in oppoſition to them, and not to rely upon the ſole ſupport of *Authority*, *Legends*, and *feigned Miracles*: and whilſt that *Subtlety of reaſoning* and *diſtinguiſhing* continues amongſt our *Adverſaries*, 'tis no leſs than *apparent madneſs* to caſt our *Arms* away, and deſert thoſe courſes *by which alone* ſo great a part of the Nation is to be reduced, and *Foreign encroachments* prevented. The Study of *Learned Languages* is ſo neceſſary to *Eccleſiaſtical* and *Civil Hiſtory*, and the underſtanding thereof (together with the *Original Scripture*) ſo requiſite to our *State* and *Church*, that they muſt be *enemies to both* that diſcourage *thoſe Studies*, and looked upon as ſuch as manifeſtly go about to ruine their *Native Countrey*. With what *facility* are thoſe *Arguments* ſolved in an *Academical* way, which perplex the *ignorant*? What *ſenſe* do thoſe *terms* bear to an *underſtanding perſon* which ſeem *inſignificant* and *contradictious* or *non-ſenſical notions* to thoſe of *lower intellectuals*? What *intricate caſes* are reſolved, when it is made evident that their *Authors* are *ſpurious*, or intended otherwiſe? As to that *uſual exception* that 'tis an *empty* and *mean employment* for *generous youth* to be waſted in the ſtudying of *Languages*, and *chopping of Logick*;

it argues *no judgement* in those that use it: for nothing is *mean, despicable,* and *empty,* without which so *high and important benefits* cannot be attained: By the *same reason,* the exercises of the old *Romans* in the *Campus Martius,* the *Palæstra* and *Olympic* games, the modern *Training,* and *Cudgel-playing,* or *shooting at Butts,* must be exploded; yet no *wise man* will assent hereunto: and it is evident, that those *other studies* are as *subservient* to the ends proposed in *them,* as those *others* are to what is designed *therein.* All these so *considerable advantages* which our *Church* and *State* derives from *Academical* education, are designed to be overthrown by the *Historian,* and the common entertainments of the *Virtuosi* consist in debauching our *Nobility, Gentry,* and all the *youth* from *those studies,* as *useless, empty,* and *impertinent*: and how *just,* how *necessary* ought that *undertaking* to seem *universally,* which hath no other end than the *silencing* of these *Comediants*? They magnifie, in opposition to all other knowledge, the *Experimental Philosophy*: were the thing *well modelled,* managed by *discreet persons,* and the *Question* rightly stated, there would be *no controversie* betwixt us: the pursuit thereof would creat us *some profit,* and much of *pleasure*: but whosoever accustomes *Children* or *Youth* to those *divertisements,* shall never breed up any *eminent personage,* nor reduce them afterwards to *serious* and *sedentary studies*: as daily observation shews: And whosoever asserts that such "*innocent* 'works will certainly have a more sure effect in the composing 'and purifying mens thoughts, than all the rigid precepts 'of the Stoical, or the empty distinctions of the Peripatetick 'Moralists: it is certain he never was acquainted with the *Stoicks,* or *Peripateticks,* but is a *Virtuosi.* I profess some shame to think that any man should oppose this *Mechanical education* to the *other,* and make use of it to disparage that *Moral discipline* which instructs us in the nature of *virtue* and *vice,* of *Distributive* and *Commutative Justice: humane actings,* and the *due course,* as well as *exorbitances of our passions*: But to prefer the advancement of *such Experiments* before the most *renowned Actions of the best Princes,* is so strange a passage, that I only say, 'tis well the *Author* thereof is an enemy to, and unacquainted with *University-Learning.* "*Non est conveniens proportio inter*

History of the *R. S.* pag. 342.

In the *Dedication* of the *History.*

Maimonides in *More Nebuchim* l. 2. c. 37.

res

res differentes specie. Non enim oportet dicere quod hominis perfectio est tanta, vel major equi perfectione. All that is said about the erecting of *Mechanical* or *Sensible Philosophy of Nature*, is but empty talk: *Humane nature* is not capable of *such atchievements*: 'tis evidently impossible to attain any *exact knowledge* of the surface of our whole *Terrestrial Globe*: and the *depths of the Earth and water*, are no less *unsearchable*: and as to the *component particles*, their *nature, figure, motions*, and *combinations* are known only to the *Deity*: so that no prudent person is to be amused with these *Rosicrucian* promises: As to the collection of the *History of Nature*, were it not *universal*, it might be of *some use*, and afford not only matter for the *railleurs*, but other pretty *illustrations* and *similitudes* for the *Rhetoricians*; but I must here complain of them for making us *false relations*, which will create us more trouble than if they had *done nothing*; and also for this, that since *these men* take upon them to upbraid all the *Aristotelians* and *Physicians* for not attending unto *Experiments*, yet do they do little more than steal the *Experiments* of others, and publish them as *their* own, without ever referring to *Authors*, except an *ingenious Virtuoso* be concern'd: would these persons be pleased to declare solemnly unto the world that they understand nothing of *antient or modern Writers* (you may see by *Aristotles* gravitation of the *Ayre*, that they never read *him*: nor *Galen*, or *Pliny*, or *Aristotle*, who speak of *Apothecaries* such as *ours*) it were but *candour* in them, and the best way to secure their credit from being thought *Plagiaries* and *Cheats*: so, if they would but get any one to teach them *Latine* and *Greek*, it would have saved *me* some trouble, as you will see in my *Animadversions* on their *History*: In fine, I doubt not but to make it plain to all the world, that some having been so *negligent*, most so *ignorant*, we can expect no great things from *them*, nor are to be concern'd for *them* at all in an affair of such importance as the change of *our Education* and *Religion*. They might have appeased *me*, would they have called in *those two books*; but since they would not do that, I suspect their intentions, and that they drive on *Campanella's* project: *why should they else have scrupled at it?*

Is

Is it below *them* to *acknowledge their errours*, whereas they blame the *Peripateticks* for refuſing to confeſs *theirs*? I am inform'd *by you* that *they ſay many of my citations are falſe*: but no man *of reading* will ſay ſo: they were *true* when they went from *me*; if the Printer have miſtook, I cannot help it: a *Stratagem* of *theirs* hinder'd me from correcting the *Preſs*: I know ſome books are *miſnamed*, but ſuch *Scholars* as they pretend to be (and who offer to tell the *Parliament* of what in *each invention* is *new* or *old*) can eaſily correct that: as where I cite *Scheinir*: *roſ. Vagin*: any ordinary man can tell it ſhould be *roſa Urſin*: and ſo for other defaults: but if the *poor Devils* cannot tell how to apprehend ſuch *Errata*, if they will ſend to *me*, I will rectifie any *citation*, rather then they ſhould give them a *needleſs trouble* in denying it. There is not *one allegation* that I have not conſulted my ſelf, except what relates to *Pecquet* and *Merſennus*: and neither of thoſe were they injured in; but my books being burnt at *London*, thoſe two pieces I wanted: but as to *Pecquet*, if you look into *him*: you will find not only the *gravitation of the Atmoſphear*, but the *Elaſticity* and compariſon with a *Fleece of Wooll*, and Experiment of the *Barometer* (not the *non-ſenſical appellation*) related as *amply* as in any of the *Virtuoſi*: and it is in this manner that *I have injured* them. But they muſt ſay ſomething to preſerve their credit; yet have I *a thouſand faults* more to charge them with: but I reſerve them for *another Treatiſe*, which if *they do not ſubmit* to the two *Univerſities*, and the *Colledge* of *Phyſicians*, I will publiſh. In truth, no *Phyſician* can joyn with *them*, or give *them* any countenance without *betraying his Faculty* to moſt *unworthy Empiricks*. It is intollerable that a company of men that know not what belongs to a *Diſeaſe*, or *Remedy*, ſhould arrogate as they do. I have already ſhew'd the long uſe of *Ivy-berries* for the *Plague*: this they bring (out of *Parkinſon*!) for an *Arcanum*! The *Lunar* Pills as to the *main ingredient* was publick in *Tenthelius* and *Mynſicht*: but the making of the *Luna Cathartica* into *Pills* with *white-bread crumbs* is their *invention*! And if the additional *crumbs of bread* works not the *miracles* (as indeed neither do the *Pills* anſwer expectation at all) neither

Pecquet d ſſert Anatom. c. 8.

Tenthelii exeges. Chymiatr. *de magiſterio Luna*, & *Mynſicht de Cathartico argenteo.* I do not cite *A. Sula*, becauſe he adds not *Nitre.*

is

is the addition of *Nitre* new, nor the *discovery* above what we knew before. I dare undertake to make an *Experimentator* of any insipid *Aristotelian* at *this rate*, let him but pretend to *other mens discoveries*: a *little wit* and a *brazen-face* will serve to that purpose, *without Studying*. As to what you farther add, that they decry me for an *Atheist*, and one of *no Religion*: First, I reply that it doth not become *any of them* to upbraid *me* therewith; or if that procedure be excusable, it admits only of *this Apology*, that being to Character a man *altogether unknown* to most, and not *intimate* with any of them, they make *themselves* the *Original*, and so *coppy* me out *thence*: this is a *fallacy* our *senses* commonly betray us into; for the things which we are unacquainted with farther than by report, or *deceitful Telescopes*, we presently fancy to *resemble* more or less *those objects we daily converse with*: and the *Virtuosi* being *sensible Philosophers*, act according to *their principles* herein, though not according to *real truth*. Secondly, if ever my *tongue* (I am sure my *actions* have not) ever given any occasion to *conjecture so of me*, I beg pardon of *God* and the *world* for it: but the occasion of such reports was rather from the *malice* of men, than that they had any ground for it; unless this *were one*, that during the *late times*, because I would joyn with *no party* in a *Church*, they imagined that I could be of *no Religion*; whereas I did no more than *Chrysostome* and others before me: A second enducement may have been a custom natural unto me, to defend the *absent* or *depressed*, or *excuse them* against the *censures of illiterate Adversaries*: other ground I know none, and it is not to be deduced by any man from any of my *present writings* I am sure; but the contrary: And it is strange that men pretending to a respect for *our Church*, should thus *conspire* to defame me for so *seasonable* and *powerful a defence thereof*: it being obvious to see that *hereby* I recede from my *Temporal interest*, which *they* know might be better made up by *open debauchery*, *indifferency as to Religion*, *flattering* and *lying*: not to mention the *present* and *future dangers* I run into by this attempt, the final issue whereof is scarce likely to antedate my death: If a profession of the *Protestant Religion*, *Union with the Church*

of

of England, *an unblamable life*, and the *hazards* I now encounter *voluntarily*, cannot justifie me against *these imputations*, let them produce *as much* in *their behalfs*, and acquaint me what *more* is requisite, and they shall find I will not decline any *fitting testimony* whereby to undeceive *them*: so that they ought not to upbraid a man who appears principally concerned for the *Church* and *Protestant Religion* with such a *Calumny*, which might with great shew of justice be fixed upon all the Abettours of that *History* of *theirs*. As for the rest you write about, I value it not: those *untruths* are easily refuted; and as yet I cannot believe that they will avow *them* in Print: Let us leave them Sir, *to talk a little* as yet; they have been used to spend their discourses in *commendation of one another*; be *contented* that you have some *new discourse*: would you have *them* so soon to *hold their peace*? I know a Gentleman who *in the wars* of *Ireland* at one blow cut off a *man's head*, and the *headless trunk* clapp'd spurs to the horse sides and rid about *ten yards after*: Let these *loosers* talk a little; and then *retire* and *work*, and so cure *their passions* (according as Mr. *Sprat* adviseth) and endeavour to *regain their credit*, which I think is *irrecoverably* lost, if others, *by my example*, will pursue *their failings*. As to his *Majesty*, he cannot suffer when these *Spirits* dis-appear, who like those *Phantasmes* in the *Mines* have made a great shew of *doing much*, but upon enquiry no such performances are *really found*: All posterity will celebrate the glory of his intentions to improve the *knowledge* and *trading* of this Nation: and he is possessed of so many *Royal Virtues* that render him the object of all *our esteem*, that the *removal of these* now will not *derogate* from, but *illustrate* his Renown, and confirm *England* in the Reverence of his *generosity* and their *detestableness*: But I doubt I trespass too much upon your patience, and that you are tyred, as I am with *writing*, but not with *any professions* that becomes

G. *Agricola* de animantibus subterran.

Your most humble Servant

Warwick, June 2. 1670.

Hen. Stubbe.

The Postscript.

SIR,

THE *News* you write me about Dr. *Merrett* did at first a little surprise me, and had I not during this last year been accustomed to the *puny Stratagems* of the *Virtuosi*, I should have wondered much to understand that I was entitled to the *Lex Talionis*, or that *Apologie for Apothecaries to practice Physick*. But the *Comediants* finding their anger insignificant against me, by reason of the advantages which *their ignorance* had given me over them, have ascribed unto me a *book* which admits of an *easy reply*, and which enterferes with the *Colledge of Physicians*, that so they might seem to *baffle* and *inodiate* me at once in the judgement of that *profession* for which I seem concern'd. I cannot make any particular defence, not having seen *his book*: but if Dr. *Merrett* had consulted the *principal Apothecaries*, I doubt not but *some of them* could have given him an account of my intentions, and how different my sentiments were from those of *that Authour*: and it was easie for him to learn that I was not the *penner* or *approver* of the other piece. I writ to some of the Company of *Apothecaries* desiring them to compose the growing *fewd* betwixt them and the *Colledge*, and told them that I neither could nor would encourage them against that *Illustrious Assembly*; that it was the interest of *Physicians* to employ Apothecaries, as a *distinct profession*; and that it was the *prudence* of *States* that it should be so: that I could deduce the difference of the *employments* thorough Antient and Modern *Greece*, as well as *Rome*: and that the reasons to be alledged against *Physicians* prepairing their *own Medicaments* were such as admitted of *no answer*, nor *evasion* amongst *under-*

ſtanding men: but that I could never *invent* or meet with any arguments that could induce me to allow of *practicing Apothecaries*; and that I underſtood ſo well the *extent* and *difficulty* of my *profeſſion*, that (however they might in *ſome caſes* proſper) I could never defend that *aſſertion*. I deſired them to conſider that if any *heats* or *indignities* had paſſed from the *Colledge* towards them, it was their *wiſdom* to *paſs them by*, and not to abandon their *important concernments* to indulge any *paſſion*: that the effect of this *conteſt* would be, that the impertinent *Virtuoſi* and inſolent *Quack-ſalvers* would carry away all the *advantage*: to conclude, there were many defaults needed regulation *in them*, that although the *Phyſicians* in general would be prejudiced by *this diſpute*, yet ſo many *eminent perſons* would continue *famous*, as might divert the Storm upon the heads of the *Apothecaries*, and if the *Colledge* would joyn effectually therein, the *project* is not *difficult*, though I would not intimate it. I did therefore earneſtly recommend unto their conſiderations an *union*, and that they would not delude themſelves that they could proſecute *their Trades* long, if that *famed body of men* did reſolve againſt *them*, with whoſe *determinations* I did not doubt but all *intelligent practitioners* in the *Countrey* and *Counties* would comply: but I hoped we ſhould not be put upon *thoſe extreams*. I adviſed them to reflect upon our *common Enemies* the *Royal Society*, and ſee if *they* were not the *principal Incendiaries*: that all the books that had been yet written on *that Subject* proceeded from *them*; and that I looked on it as a deſign of *theirs* to aggrandiſe themſelves upon the *ruine* of the *Colledge* (a thing they have alwayes endeavoured) and *Apothecaries*: that there wanted not of *them* who purpoſed to erect a *Laboratory* and *Shop*, whence all ſhould be furniſhed *cheaper* and *better* than now, as to *general Medecines*, provided *they* would act *themſelves* in the more common and frequent *Medicaments*: that if they proceeded herein, the *Virtuoſi* might facilitate their *deſign*, though their *ignorance* and *unfaithfulneſs* be ſuch that all men ought to oppoſe *theſe Projectors*. Upon this account I did largely handle that Queſtion, *Whether Phyſicians ought to make their own Medecines*? which I reſolved in the *Negative*, and urged all thoſe arguments

arguments (with ſeveral illuſtrations) which have hitherto ſwayed with *prudent Governours* and *Phyſicians* to eſtabliſh the *received uſage*: but I proteſted againſt any encouragement for *Apothecaries to practice*. I anſwer'd all that Dr. *Merrett* had alledged, and ſhewed his *intollerable ignorance* in that book; and if we might take an eſtimate of *his parts* from *that writing*, 'twas manifeſt he might better imploy his time in ſtudying the *method of Phyſick*, than compoſing *Medicaments*: that after 30. years practice 'twas evident he underſtood not the *Rudiments of that noble Science*, nor could *ſtate a caſe* therein. As for Dr. *Goddard*, who had writ more *warily* and with *greater prudence*, I only diſſented from him in the *Antiquity of Apothecaries*, and treated him as a *Phyſician* whom I pittyed for being mixed with ſo *illiterate a company*. This was the purport of my Treatiſe, which was joyned with another *miſcellaneous Diſcourſe* about the *errours* and *cheats* of the *Virtuoſi*; and the pernicious influence they would have ere long upon *all Trades* and *Profeſſions*, when they had more *inſpected* them: that they began with the *rectifying Apothecaries*, but where they would *end* I did not know: that it behooved *all men* to combine againſt *them*, the tendency of whoſe *deſigns* was ſo *fatal* and *malignant*: that I hoped the *Phyſicians* would conſult their *common intereſt* in oppoſition to the *Thomſons* and *Odowdes*, &c. and act with that moderation which became *wiſemen*, & who were tender of continuing the *renown of their Faculty*, which would ſuddenly elſe devolve into the hands of *Empiricks*; and demean themſelves with that *moderation* which might end in an accord with the *Apothecaries*: that this quarrel was *inconſiderable*, and indeed (as Dr. *Merrett* confeſſeth) of no *longer continuance* then that of the R. S. and would receive a *period* with *their overthrow*; which not only all *Doctors*, but all *good men* ought to endeavour; that the *diſaſters* of the late *Dutch* Warr, the *Plague*, and *Fire of London* were leſs inconveniences than *their perpetuity*: that *theſe calamities* admitted of *ſome remedy* hereafter; but the *evils* they are likely to occaſion *us*, would never be corrected by any *humane prudence*; and I doubted whether *God* would ſupport us by *his providence*, when they had debauched the Nation from all *Picty* and *Morality*, as well as *civil* wiſ-

dom. This was the ſubject of *that Book*, which I doubt not but will be approved by all *judicious perſons*: and the *Colledge* will ſee that I can write againſt Dr. *Merrett* without derogating *from them*; or rather that my intendments were to *ſupport them*, and not diſ-ſerve the *Apothecaries* in the leaſt. I intend to make it publick in *Michaelmas* Term: the paſſage of *Campanella* being taken out thence, hath occaſioned that *breach* in it which I have not leiſure now to redreſs: and perhaps I may call thoſe other writings of the *Virtuoſi* to an examination, which have been the principal cauſe of all *theſe controverſies*, and which if they be not refuted, 'tis in vain to attack the *Medela Medecinæ*, *Mainwairing*, &c. They muſt blame *themſelves*, not *me*, for any undertaking of this nature; *ordinary prudence* would have inabled *them* to foreſee the *iſſue* of *thoſe kind of writings*; and a *proportionate candour* now would induce them to *retract them*, without enforcing me to ſhew how many *unreaſonable tryals* they put *us* upon; how many *impertinences* they ſuggeſt unto us; how *deluſory* their *Medicaments* are; how 'tis their uſual practice to vouch thoſe things for *new diſcoveries* which we very well *knew before*, and to which if *they were ſtrangers*, it is becauſe they were not acquainted with the practice of the moſt *eminent Phyſicians*. Let them therefore hence forward permit the *Phyſicians* to be Judges of their *own Science*, and give them the credit beſt to underſtand *their own deficiencies*, and the occaſions of any failours in *their practice*. The *blind* may as well judge of *colours*; the *inſenſible* concerning the objects of *feeling*, as the *Virtuoſi* of *Phyſick*. This is no knowledge that ariſeth from *natural wit* alone: *Fancy* without *judgement*, *reading*, and *obſervation* will not enable them hereunto: This is a performance *too great* for the *Merretts* and the *Sydenhams*: as I ſhall ſhew hereafter; and as little agreeing with Dr. *Sprat*, or Mr. *Glanvill*, whoſe abilities in matters relating to *their profeſſion* are ſo contemptible, that 'twere *folly* to expect *much* from them *where they profeſs not*. I have not time to enlarge farther, being now employed *otherwiſe*, and having appointed to ſpend the next week or two at *Bath* in attendance of a Neighbouring Patient.

Rogley June 14. 1670.

Yours, &c.

FINIS

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